Pertussis

(Also known as Whooping Cough)

IMMEDIATELY REPORTABLE DISEASE

Per N.J.A.C. 8:57, health care providers and administrators shall immediately report **by telephone** confirmed and suspected cases of pertussis to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. The health officer (or designee) **must immediately institute the control measures listed below in section 6, "Controlling Further Spread,"** regardless of weekend, holiday, or evening schedules.

Directory of Local Health Departments in New Jersey

and

Directory of After Hour Emergency Contact Phone Numbers for Local Health Departments in New Jersey, both available at:

http://www.nj.gov/health/lh/community/index.shtml

If the health officer is unavailable, the health care provider or administrator shall make the report to the New Jersey Department of Health by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.

June 2022

1 THE DISEASE AND ITS EPIDEMIOLOGY

I. Etiologic agent

Pertussis is caused by a type of bacteria called *Bordetella pertussis.* These bacteria attach to the cilia that line part of the upper respiratory system. The bacteria release toxins, which damage the cilia and cause inflammation of the respiratory tract, which interferes with the clearing of pulmonary secretions.

II. Clinical features

Pertussis is a respiratory illness commonly known as whooping cough.

A. Stages of disease

1) Catarrhal stage

- Characterized by insidious onset of mild upper respiratory symptoms including low-grade fever, coryza (runny nose), sneezing, and a mild, occasional cough.
- During the 1 - 2 weeks of this stage, the cough gradually becomes more severe.

2) Paroxysmal stage

- Characterized by spasmodic coughing episodes, or paroxysms, sometimes followed by a long inspiratory whoop sound. Paroxysmal attacks occur more frequently at night.
- Patients may become cyanotic during paroxysms.
- Children and young infants may appear very ill and distressed.
- Post-tussive vomiting and exhaustion commonly follow the episode.
- This stage usually lasts 1 - 6 weeks, but may persist for up to 10 weeks.

3) Convalescent stage

- Recovery is gradual. Paroxysms subside and the cough may disappear in 2 - 3 weeks.
- Coughing fits can go on for up to 10 weeks or more.

B. Clinical considerations

Disease presentation varies with age and history of previous exposure or vaccination.

1) **Infants -** pertussis in infants < 6 months of age may present with atypical symptoms which include:

    - Short catarrhal stage,
    - Gagging, gasping, or apnea in early stages,
    - Absence of whoop, and/or
    - Prolonged convalescence.

2) **Adolescents and adults -** older adolescents and adults may have milder symptoms particularly if previously immunized.

C. Clinical complications

The most common complication, and the cause of most pertussis-related deaths, is secondary bacterial pneumonia. Young infants are at the highest risk for acquiring pertussis-associated complications. Other complications in young infants include seizures, encephalopathy, and death. Complications in adolescents and adults include syncope, sleep disturbance, incontinence, rib fractures, and pneumonia.

III. Epidemiology

Pertussis is a highly communicable disease transmitted through droplets. People with pertussis usually spread the disease by coughing or sneezing while in close contact with others, who then breathe in the pertussis bacteria.

A. Incubation period

7 to 10 days, with a range of 5 to 21 days.

B. Communicability

Patients are most infectious early in the illness, but communicability may persist for 3 weeks after onset of cough. After 3 weeks of cough, a patient is considered unable to spread the illness to others. Antimicrobial treatment decreases communicability and may limit the spread of disease. Patients are considered to be non-infectious after completing the 5th day of appropriate antimicrobial treatment; however, they should complete the full treatment regimen.

C. Communicability calculator

First day of communicability: date of cough onset.

Last day of communicability: date of cough onset + 21 days, OR after completing the 5th day of appropriate antibiotic treatment.

IV. Background

Pertussis occurs worldwide. It is an endemic disease in the United States, with peaks in disease every 3 to 5 years and frequent outbreaks. Pertussis has no distinct seasonal pattern, but it may increase in the summer and fall. Asymptomatic infection (carriage) has been demonstrated and may play a role in transmission. Pertussis is highly infectious, with secondary attack rates of 80% among susceptible household contacts. Before the availability of vaccine, pertussis was a common cause of morbidity and mortality among children. During the 6 year period from 1940 through 1945, more than 1 million cases of pertussis were reported, an average of 175,000 cases per year (incidence of approximately 150 cases per 100,000 population).

Following the introduction of whole-cell pertussis vaccine in the 1940s, pertussis incidence gradually declined, reaching 15,000 reported cases in 1960 (approximately 8 per 100,000 population). By 1970, annual incidence was fewer than 5,000 cases per year, and during 1980-1990, an average of 2,900 cases per year were reported (approximately 1 per 100,000 population). Pertussis incidence began increasing in the early 1980s. In 2012, 48,277 cases were reported nationwide, exceeding levels

observed since 1955. Reported pertussis cases have decreased since 2012, with 18,975 cases reported during 2017; however, levels remain significantly increased compared to those observed during the 1990s and early 2000s.

Multiple factors have likely contributed to the increase, including waning immunity from acellular pertussis vaccines, heightened provider and public awareness, improved diagnostic testing, and possibly molecular changes within the pertussis bacterium. The incidence of pertussis remains highest among young infants. From 2012 through 2017, 66.7%, of all pertussis-related deaths (n = 72) reported to CDC were among infants less than two months of age, who were too young to have received DTaP vaccine. As of 2017, the second highest incidence of pertussis continues to occur among school-aged children and adolescents. More information on secular trends in the U.S. can be found here: http://www.cdc.gov/pertussis/

2 CASE DEFINITION

I. New Jersey Department of Health case definitions

Pertussis cases are reported by states to CDC through the National Notifiable Diseases Surveillance System (NNDSS). The New Jersey Department of Health (NJDOH), Vaccine Preventable Disease Program follows the most current case definition as published on the CDC NNDSS website. For the most recent case definition please visit:

https://ndc.services.cdc.gov/case-definitions/pertussis-2020/

A. 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)

* Differential diagnosis of pertussis may include other respiratory pathogens such as adenoviruses, *Bordetella parapertussis*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, COVID-19 (SARS-CoV-2) and Respiratory Syncytial Virus (RSV).

B. Laboratory criteria for diagnosis

Confirmatory laboratory evidence:

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

C. Epidemiologic linkage

Contact with a laboratory-confirmed case of pertussis.

D. Case classification (as of 2020)

1) 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 or 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)

2) Confirmed

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

3) Case classification comments

An individual reported only with pertussis serology results, or having had no laboratory testing performed, may still meet clinical case definition for pertussis despite not being laboratory-confirmed. In addition, a negative laboratory result does not rule out pertussis if the individual meets the clinical case definition and there is no alternate diagnosis provided by the clinician.

For assistance with case classification, please consult with the NJDOH at (609) 826-5964.

E. Outbreak definitions

A pertussis outbreak is when the number of reported cases is higher than what is expected on the basis of previous reports during a non-epidemic period for a given population in a defined period of time (i.e., historical disease patterns). Pertussis outbreaks can be **difficult to identify and manage**, and cases of pertussis may go unreported. Other respiratory pathogens often cause symptoms similar to pertussis. During pertussis outbreaks, the primary goal is to protect babies from getting sick and dying from pertussis. A second goal is to protect people of all other ages from getting pertussis.

As of 2022, there is no standard pertussis outbreak or cluster definition. Any time there is suspicion of a pertussis outbreak, CDC recommends getting confirmation with culture for at least one suspected case since PCR tests vary in specificity. **Before declaring a pertussis outbreak, planning/initiating any outbreak control measures, or issuing outbreak notifications, please notify and consult with the NJDOH at (609) 826-5964.**

3 LABORATORY TESTING AND DIAGNOSIS

The diagnosis of pertussis is based on a characteristic clinical history as well as a positive culture or PCR. These tests are more reliable when performed early in the course of the illness. All specimens should be nasopharyngeal specimens, NOT pharyngeal (throat). **Testing of asymptomatic contacts is not necessary and should be discouraged.**

I. Diagnostic tests

A. Bacterial culture

Bacterial culture is the standard pertussis diagnostic laboratory test. A positive culture for *B. pertussis* is particularly useful for confirming pertussis diagnosis when an outbreak is suspected.

Bacterial culture is best when specimens are collected during the first 2 weeks of cough. Success in isolating the organism declines if the patient has received prior antibiotic treatment effective against *B. pertussis*, if specimen collection has been delayed beyond the first 2 weeks of illness, and if the patient has been vaccinated.

B. Polymerase Chain Reaction (PCR)

PCR is a molecular technique used to detect DNA sequences of the *Bordetella pertussis* bacterium, and unlike culture, does not require viable (live) bacteria present in the specimen. PCR is a rapid test and has excellent sensitivity. PCR tests vary in specificity, so obtaining a culture confirmation of pertussis for at least one suspect case is recommended any time there is suspicion of a pertussis outbreak. Results should be interpreted along with the clinical symptoms and epidemiological information. PCR should be tested from NP specimens taken during the first 3 weeks of cough when bacterial DNA is still present in the nasopharynx, but may provide accurate results for up to 4 weeks of cough. After the fourth week of cough, the amount of bacterial DNA rapidly diminishes which increases the risk of obtaining falsely-negative results. Additionally, the risk of obtaining falsely-negative results increases if the patient has received prior antibiotic treatment against *B. pertussis*. Some pertussis vaccines have been found to contain PCR-detectable *B. pertussis* DNA. It is important for providers to follow best practices to prevent contamination of specimens with pertussis vaccine DNA. The high sensitivity of PCR increases the risk of false-positivity, but following best practices can reduce the risk of obtaining inaccurate results.

CDC's Best Practices for Health Care Professionals on the use of PCR for diagnosing pertussis can be found here: http://www.cdc.gov/pertussis/clinical/diagnostic-testing/diagnosis-pcr-bestpractices.html

C. Laboratory Testing Comments

Commercially available serologic assays used in the United States have unproven or unknown clinical accuracy and so are not considered reliable at this time. Generally, serologic tests are more useful for diagnosis in later phases of the disease.

While serology is not considered confirmatory, with respect to the public health case definition, positive results reported in CDRSS can potentially indicate illness and should be fully investigated to determine whether the individual meets the clinical case definition for probable pertussis.

Direct fluorescent antibody (DFA) tests are no longer recommended by CDC or the NJDOH.

***Note: The NJDOH Public Health Environmental Laboratories (PHEL) does not perform routine laboratory testing for *B. pertussis* for the general public. Testing is usually conducted through private commercial laboratories.**

II. Specimen collection

All suspected cases of pertussis should have a nasopharyngeal (NP) aspirate or swab obtained for culture or polymerase chain reaction (PCR) testing. NP aspirates and swabs are specimens obtained by taking a sample of secretions from the uppermost part of the throat, behind the nose, to detect *B. pertussis*. CDC has developed educational materials including two short training videos for collection of NP aspirates and swabs, which can be found here: http://www.cdc.gov/pertussis/clinical/diagnostic-testing/index.html

For *B. pertussis*, NP aspirates have similar or higher rates of recovery than NP swabs and therefore are the preferred method of specimen collection. Aspirates are also better to use if another diagnostic test (e.g., PCR) is to be performed on the same specimen.

4 DISEASE REPORTING AND CASE INVESTIGATION

I. Importance of rapid case identification

Early diagnosis and treatment might limit disease spread. When pertussis is highly suspected, attempts to identify and provide postexposure prophylaxis (PEP) to close contacts should proceed without waiting for laboratory confirmation. When suspicion is low and there are no identified high-risk contacts, PEP can be delayed until there is laboratory confirmation of the diagnosis. However, PEP of infants and their household contacts should not be delayed because pertussis can be severe and life-threatening to young infants. Additional information on PEP can be found in Sections 5 and 6.

II. Importance of surveillance

Surveillance for pertussis is used to:

- Assess burden of disease and monitor changes in epidemiology over time
- Guide policy and development of control strategies
- Monitor national trends in disease and identify populations at risk
- Identify clusters of related cases that might indicate an outbreak
- Guide vaccination policy development
- Monitor changes in the *B. pertussis* organism

III. Reporting and case investigation

Per New Jersey Administrative Code (N.J.A.C. 8:57), confirmed and suspect cases of pertussis (*Bordetella pertussis**) must be *immediately* reported by telephone to the local health department where the patient resides. It is the Health Officer's responsibility to report and investigate cases of pertussis within their jurisdiction.

***Note: single cases of *Bordetella parapertussis* are not reportable**.

A. Case investigation

The primary objective of the case investigation is to ensure that high risk close contacts of the patient are identified and referred to their health care provider for chemoprophylaxis to prevent further spread of illness.

A second objective of the case investigation is to document information obtained and actions taken. Thorough and timely documentation in Communicable Disease Reporting and Surveillance System (CDRSS) will facilitate communication between disease investigators and assist with public health surveillance. Refer to Section 4.III. B., below, for specific information on filing the report in CDRSS.

Case investigations typically include review of laboratory, medical, and immunization records, as well as interviewing the medical provider to obtain information about clinical presentation and impression. Investigations also include interviews of cases, or their guardian, which are necessary to verify onset dates, symptoms, and to identify sources of infection and contacts at risk.

B. Entry into CDRSS

After notification to NJDOH, it is the Health Officer's responsibility to ensure the case is entered into CDRSS and investigated. Use the following guidelines to accurately record all case information into CDRSS:

- Demographic information, at minimum please document/verify
  - case's name
  - date of birth
  - sex
  - race/ethnicity
  - home address
  - telephone number
- Clinical information, including:
  - Date of cough onset, duration of cough (≥14 days?)
  - Signs and symptoms – cough, inspiratory whoop, paroxysms, post-tussive vomiting, apnea
  - Facility
  - Admission and discharge dates
  - Mortality
- Laboratory tests and results
  - Specimen collection date
  - Type of test
  - Results
- Immunization history (via NJIIS, provider, patient/parent record)
  - NJIIS Registry ID
  - Dates of administration of pertussis-containing vaccine doses
  - Type of vaccine
  - Reason if not vaccinated
- Treatment (antibiotics related to treating pertussis)
  - Antimicrobial agents prescribed
  - Dates and duration of treatment

*Note: additional case information may be requested by the NJDOH Subject Matter Expert (SME).

5 TREATMENT AND CHEMOPROPHYLAXIS

Antimicrobial agents have had varying effects in reducing pertussis symptoms and clearing *B. pertussis* from the respiratory system, and have been used extensively for treatment and postexposure prophylaxis (PEP). The agents, doses, and duration of PEP are the same as for treatment of pertussis. The primary objective of treatment and PEP should be to prevent severe pertussis and life-threatening complications in individuals at high risk. High risk individuals include infants younger than 12 months of age, pregnant women, or individuals with pre-existing health conditions that may be exacerbated by a pertussis infection.*

*Note: The best way to protect against pertussis infection is with vaccines, however immunization with a pertussis-containing vaccine is not recommended for treatment or PEP. Antimicrobial agents are used as treatment and to protect people who have been exposed and are at high risk of developing severe pertussis.

A. Case-patient (treatment)

Clinicians should begin antimicrobial treatment prior to receiving test results if the clinical history is strongly suggestive of pertussis or the case-patient is at high risk of developing severe disease and life-threatening complications (i.e., an infant). Clinicians should begin antimicrobial **treatment regardless of the case-patient's age and vaccination status***. After the cough is established, antimicrobial treatment has little discernible effect on the course of illness but is recommended to limit spread of organisms to others. A 5-day course of azithromycin is the treatment of choice. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for treatment. Also, immunization with a pertussis-containing vaccine is not recommended as treatment. Please see the antimicrobial treatment schedule below in Section 5C for dosage and duration of treatment by age group.

***Note: initiating treatment > 3 weeks after cough onset has limited benefit to the case-patient. However, treatment is recommended up to 6 weeks after cough onset in high risk case-patients.**

B. Contacts (PEP)

If pertussis is highly suspected in a patient, PEP should be administered to contacts at high risk of developing severe pertussis and life-threatening complications and to contacts having close contact with persons at high risk of developing severe pertussis and life-threatening complications. **PEP should be administered regardless of the contact's age and vaccination status***. Early use of PEP in close contacts may limit secondary transmission. A 5-day course of azithromycin is the appropriate first line choice for PEP. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for PEP. Also, immunization with a pertussis-containing vaccine is not recommended for PEP. Please see the PEP schedule below in Section 5C for dosage and duration of treatment by age group.

***Note: initiating PEP > 3 weeks after last exposure to a patient with pertussis has limited benefit to contacts. However, PEP should be considered for high risk contacts (i.e., infants) up to 6 weeks after exposure. Examples of persons considered to be high risk can be found in Section 6.**

C. Antimicrobial treatment and PEP schedule*

Please see the recommended antimicrobial treatment and PEP schedule for pertussis below. This schedule is available in the American Academy of Pediatrics Red Book: 2021 Report of the Committee on Infectious Diseases. Itasca, IL: American Academy of Pediatrics: 2021 [Table 3.44, page 581].

Additional information on PEP can be found in Section 6.

Table 3.44. Recommended Antimicrobial Therapy and Postexposure Prophylaxis for Pertussis in Infants, Children, Adolescents, and Adults[a]

	Recommended Drugs			Alternative
Age	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

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.

This schedule is available in the American Academy of Pediatrics Red Book: 2021 Report of the Committee on Infectious Diseases. Itasca, IL: American Academy of Pediatrics: 2021 [Table 3.44, page 581].

*Please check updated resources to ensure appropriate antibiotic choices and dosages.

6 CONTROLLING FURTHER SPREAD

I. Isolation requirements (N.J.A.C. 8:57-1)

The current recommendations of CDC and NJDOH (as of 2022) are as follows:

A. Isolation/exclusion of a case-patient

A patient is considered infectious from the onset of cough through 21 days after cough onset, OR until the completion of the 5th day of appropriate antimicrobial treatment. A 5-day course of azithromycin is the treatment of choice. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for treatment. Also, immunization with a pertussis-containing vaccine is not recommended as treatment. Symptomatic patients* should be excluded from all activities until the completion of the 5th day of appropriate antimicrobial treatment. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

***Note: symptomatic patients who do not take the appropriate antimicrobial treatment should be excluded through 21 days from the onset of cough. This recommendation includes health care workers (HCWs).**

B. Management of contacts

Close contacts exposed to pertussis, whether they have symptoms or not, should be referred to their health care provider for evaluation.

If pertussis is highly suspected in a patient, PEP should be administered to contacts at high risk of developing severe pertussis and life-threatening complications and to contacts having close contact with persons at high risk of developing severe pertussis and life-threatening complications. **PEP should be administered regardless of the contact's age and vaccination status*.** Early use of PEP in close contacts may limit secondary transmission. A 5-day course of azithromycin is the appropriate first line choice for PEP. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for PEP. Also, immunization with a pertussis-containing vaccine is not recommended for PEP of a contact. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

***Note: initiating PEP > 3 weeks after last exposure to a patient with pertussis has limited benefit to contacts. However, PEP should be considered for high risk contacts (i.e., infants) up to 6 weeks after exposure.**

1) Asymptomatic contacts

- Asymptomatic contacts, regardless of receiving PEP, should not be excluded from their usual activities. **Please see *Note below**.
- Asymptomatic contacts should be monitored closely for symptoms for 21 days (one incubation period) after their last exposure to the infected patient.
- For asymptomatic contacts, if exposure occurred more than 21 days (one incubation period) ago, PEP is not indicated.

***Note: in certain situations deemed to be high risk, NJDOH may recommend the exclusion of asymptomatic contacts not receiving prophylaxis AND/OR may extend the exclusion period up to 42 days (two incubation periods).**

2) Symptomatic contacts

- Symptomatic contacts should be evaluated as suspect pertussis cases regardless of age and vaccination status.

- Symptomatic contacts should be excluded from all activities until the completion of the 5th day of appropriate antimicrobial treatment. Symptomatic contacts who do not take the appropriate antimicrobial treatment should be excluded through 21 days from the onset of cough.

- If symptomatic contacts are already beyond their infectious period (21 days from the onset of cough), treatment has limited benefit and no exclusion is required.

II. Postexposure antimicrobial treatment (aka PEP)

The primary objective of PEP should be to prevent severe pertussis and life-threatening complications in individuals at high risk. **PEP should be considered regardless of age and vaccination status.** CDC and NJDOH are engaged in actively promoting the judicious use of antibiotics among health care providers and patients by targeting postexposure antibiotic use to people at high risk of developing severe pertussis, as well as people who will have close contact with others at high risk of developing severe pertussis.

Therefore, the CDC and NJDOH support the following:

- **Providing PEP to all household contacts of a pertussis case** (within 21 days of onset of cough in the index patient).

- **Providing PEP to high risk people within 21 days of exposure to an infectious pertussis case. High risk people are those who personally are at high risk of developing severe illness, or those people who will have close contact with people at high risk of severe illness.** High risk people include,
    - Infants younger than 12 months of age
    - Women in their third trimester of pregnancy
    - All persons with pre-existing health conditions that may be exacerbated by a pertussis infection (for example, but not to be limited to, immunocompromised persons and those with moderate to severe medically treated asthma)
    - Contacts who themselves have close contact with either infants younger than 12 months of age, pregnant women or individuals with pre-existing health conditions that may be exacerbated by a pertussis infection
    - All contacts in high risk settings that include infants younger than 12 months of age or women in the third trimester of pregnancy. These include but are not limited to, neonatal intensive care units, childcare settings, and maternity wards.

Additional information regarding PEP can be found here: https://www.cdc.gov/pertussis/pep.html

III. Managing special situations

Special situations may include household, childcare or school, and health care settings. **Before planning or initiating any control measures, please consult the NJDOH at (609) 826-5964.**

A. Household setting

Due to close proximity and long duration of exposure, transmission of pertussis from case-patients to susceptible contacts living in the same household is a frequent occurrence. Investigation of household contacts should begin immediately after reporting a suspected case of pertussis. Although all susceptible household contacts are at risk for contracting pertussis, special emphasis should be given to identifying those at high risk for developing severe pertussis and life-threatening complications and to contacts having close contact with persons at high risk of developing severe pertussis and life-threatening complications.

***Note: an interview with the case-patient or parent/guardian may reveal unreported cases in household contacts that had cough illness with onset before or after the first reported case. These cases should also be investigated.**

1) **Case-patient -** should begin antimicrobial treatment as soon as possible if pertussis is highly suspected **regardless of age and vaccination status***. After the cough is established, antimicrobial treatment has little discernible effect on the course of illness but is recommended to limit spread of organisms to others. A 5-day course of azithromycin is the treatment of choice. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for treatment. Also, immunization with a pertussis-containing vaccine is not recommended as treatment. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

   Symptomatic patients should be excluded from all activities until the completion of the 5th day of appropriate antimicrobial treatment. Symptomatic patients who do not take the appropriate antimicrobial treatment should be excluded from all activities through 21 days from the onset of cough.

***Note: initiating treatment >3 weeks after cough onset has limited benefit to the case-patient. However, treatment is recommended up to 6 weeks after cough onset in high risk case-patients.**

2) **Household contacts –** provide PEP to all household contacts **regardless of age and vaccination status****. Early use of PEP in close contacts may limit secondary transmission. A 5-day course of azithromycin is the appropriate first line of choice for PEP. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for PEP. Also, immunization with a pertussis-containing vaccine is not recommended for PEP of a close contact. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age. Asymptomatic contacts, regardless of receiving PEP, should not be excluded from their usual activities. **Please see *Note below**.

***Note: in certain situations deemed to be high risk, NJDOH may recommend the exclusion of asymptomatic contacts not receiving prophylaxis AND/OR may extend the exclusion period up to 42 days (two incubation periods).**

****Note: initiating PEP > 3 weeks after last exposure has limited benefit for contacts. However, PEP should be considered for high risk contacts up to 6 weeks after exposure.**

B. Childcare or school setting

If a case of pertussis is identified in a childcare or school setting, please notify the local health department where the patient resides and the school nurse*. Consider sending a notification letter to parents/guardians and staff about the case of pertussis. Letters can be distributed to exposed classrooms, grades, extracurricular groups, or to the entire childcare or school depending on the situation. Promote Tdap vaccine for adolescents and adults, including school staff, teachers, and coaches, particularly in the event of an outbreak. Remind parents about the importance of keeping their younger children up-to-date on the DTaP vaccine series.

Before distribution of notification letters, please consult the NJDOH at (609) 826-5964.

***Note: an interview with the school nurse may reveal unreported cases in the childcare or school that had cough illness with onset before or after the first reported case. These cases should also be investigated.**

1) **Case-patient** – should begin antimicrobial treatment as soon as possible if pertussis is highly suspected **regardless of age and vaccination status*.** After the cough is established, antimicrobial treatment has little discernible effect on the course of illness but is recommended to limit spread of pertussis to others. A 5-day course of azithromycin is the treatment of choice. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for treatment. Also, immunization with a pertussis-containing vaccine is not recommended as treatment. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

   Symptomatic patients should be excluded from childcare or school and any extracurricular activities until the completion of the 5th day of appropriate antimicrobial treatment. Symptomatic patients who do not take the appropriate antimicrobial treatment should be excluded from childcare or school and any extracurricular activities through 21 days from the onset of cough.

***Note: initiating treatment >3 weeks after cough onset has limited benefit to the case-patient. However, treatment is recommended up to 6 weeks after cough onset in high risk case-patients.**

2) **Childcare or school contacts -** If pertussis is highly suspected in a patient, PEP should be administered to contacts at high risk of developing severe pertussis and life-threatening complications and to contacts having close contact with persons at high risk of developing severe pertussis and life-threatening complications **regardless of the contact's age and vaccination status.** Early use of PEP in close contacts may limit secondary transmission. A 5-day course of azithromycin is the appropriate first line of choice for PEP. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for PEP. Also, immunization with a pertussis-containing vaccine is not recommended for PEP of a contact. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group. Asymptomatic contacts, regardless of receiving PEP, should not be excluded from their usual activities. **Please see *Note below**.

***Note: in certain situations deemed to be high risk, NJDOH may recommend the exclusion of asymptomatic contacts not receiving prophylaxis AND/OR may extend the exclusion period up to 42 days (two incubation periods).**

****Note: initiating PEP > 3 weeks after last exposure has limited benefit for the contacts. However, PEP should be considered for high risk contacts up to 6 weeks after exposure.**

3) Initiate active surveillance – determine exposed groups

- Collect dates the pertussis case-patient attended childcare or school during their infectious period.
- Determine if the case-patient is involved in any after-school or school-based extracurricular activities, such as being on a sports team.
- Determine the number and ages of individuals potentially exposed.
- Notify staff and the parents/guardians of students exposed to the suspect case of pertussis.
- Evaluate close contacts of the case-patient for an acute cough illness.
- Notify the class instructor and other staff (teachers, coaches, instructors) to refer students with cough illness to the school nurse for evaluation.
- Refer all symptomatic students, teachers, and staff to their health care provider for evaluation.
- Refer all asymptomatic high risk contacts to their health care providers for evaluation.
- Consider notifying area health care providers of the pertussis case and exposure in the event students, teachers, and/or staff seek medical evaluation and diagnostic testing.
- Continue active surveillance for two incubation periods (42 days) after the date of cough onset in the last case of pertussis.

***Note: decisions about who and how to provide PEP in childcare centers or schools should depend on setting, patterns of student interaction, number of cases, and number of affected groups, etc. Before planning or initiating any control measures, please consult the NJDOH at (609) 826-5964.**

C. Health care setting

Nosocomial transmission of pertussis in health care settings among patients, health care workers* (HCWs), or both, poses a high risk of transmission to children without immunity or immunocompromised individuals. Control measures should be implemented when a case of pertussis is recognized in a health care setting. If a case of pertussis is identified in a health care setting, please notify the local health department where the patient resides and where the health care facility is located.

***Note: HCWs working with pediatric patients, particularly infants younger than 12 months of age, should be considered high risk cases because of their high probability of exposing susceptible individuals who have an increased risk for developing severe pertussis and life-threatening complications.**

1) **Symptomatic <u>health care worker</u> –** should begin antimicrobial treatment as soon as possible if pertussis is suspected **regardless of age or vaccination status***. After the cough is established, antimicrobial treatment has little discernible effect on the course of illness but is recommended to limit spread of organisms to others. A 5-day course of azithromycin is the treatment of choice. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for treatment. Also, immunization with a pertussis-containing vaccine is not recommended as treatment. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

   Symptomatic HCWs should be excluded from work until the completion of the 5th day of appropriate antimicrobial treatment. HCW's who do not take the appropriate antimicrobial treatment should be excluded from work through 21 days from the onset of cough.

***Note: initiating treatment >3 weeks after cough onset has limited benefit to the HCW. However, treatment is recommended up to 6 weeks after cough onset in high risk persons.**

2) **Symptomatic <u>patient</u> –** should begin antimicrobial treatment as soon as possible if pertussis is suspected **regardless of age or vaccination status***. After the cough is established, antimicrobial treatment has little discernible effect on the course of illness but is recommended to limit spread of organisms to others. A 5-day course of azithromycin is the treatment of choice. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for treatment. Also, immunization with a pertussis-containing vaccine is not recommended as treatment. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

   Symptomatic patients should be placed on droplet precautions until the completion of the 5th day of appropriate antimicrobial treatment. Symptomatic patients who cannot or refuse to take the appropriate antimicrobial treatment should remain on droplet precautions through 21 days from the onset of cough.

***Note: initiating treatment >3 weeks after cough onset has limited benefit to the case-patient. However, treatment is recommended up to 6 weeks after cough onset in high risk case-patients.**

1) **Exposed <u>HCWs</u> -** if exposure to pertussis occurs, PEP should be administered to HCWs at high risk of developing severe pertussis and life-threatening complications and to HCWs having close contact with persons at high risk of developing severe pertussis and life-threatening complications **regardless of age or vaccination status***. Early use of PEP in close contacts may limit secondary transmission. A 5-day course of azithromycin is the appropriate first line of choice for PEP. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for PEP. Also, immunization with a pertussis-containing vaccine is not recommended for PEP of contacts. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

   Asymptomatic health care workers who have had close contact with a pertussis case should be put under close surveillance with employee health. **HCWs may be isolated or excluded from work under certain circumstances, please consult with NJDOH at (609) 826-5964.**

***Note: initiating treatment > 3 weeks after last exposure has limited benefit for the exposed contacts. However, PEP should be considered for high risk contacts up to 6 weeks after exposure.**

2) **Exposed <u>patients</u> –** if exposure to pertussis occurs, PEP should be administered to patients at high risk of developing severe pertussis and life-threatening complications and to patients

having close contact with persons at high risk of developing severe pertussis and life-threatening complications **regardless of age or vaccination status***. Early use of PEP in close contacts may limit secondary transmission. A 5-day course of azithromycin is the appropriate first line of choice for PEP. A shorter course of azithromycin (i.e., 3 days) has not been validated and is not recommended for PEP. Also, immunization with a pertussis-containing vaccine is not recommended for PEP of contacts. Please see Section 5C, Antimicrobial treatment and PEP schedule, for dosage and duration of treatment by age group.

Asymptomatic patients who have had close contact with a pertussis case should be put under close surveillance. **Asymptomatic patients may be isolated or excluded under certain circumstances, please consult with NJDOH at (609) 826-5964.**

***Note: initiating treatment > 3 weeks after last exposure has limited benefit for the exposed contacts. However, PEP should be considered for high risk contacts up to 6 weeks after exposure.**

3) Initiate active surveillance – determine exposed groups

- Determine dates, type, and duration of exposure to the case of pertussis.
- Determine the number and ages of individuals potentially exposed.
- Refer all symptomatic individuals to their health care provider for medical evaluation and diagnostic testing.
- Refer all asymptomatic high risk contacts to their health care providers for medical evaluation.
- Depending on the type/duration of exposure to a pertussis case-patient, consider notifying persons who occupied waiting areas of their exposure so that at-home monitoring for pertussis symptoms and/or PEP can be initiated.
- Conduct active surveillance for two incubation periods (42 days) after the date of cough onset in the last case of pertussis.

IV. Preventive measures

The best way to prevent pertussis is to get vaccinated. There are several formulations of vaccines used to prevent diphtheria, tetanus, and pertussis. Some are combined with other vaccines to prevent additional diseases and reduce the total number of shots that someone receives at one office visit. Good personal hygiene is also important.

For persons not immunized or completely immunized against pertussis (particularly infants younger than 12 months of age), it is strongly recommended to speak with a health care provider about the benefits of vaccination.

A. Vaccine information – diphtheria, tetanus, and pertussis vaccines (DTaP)

In the United States, DTaP vaccines are commonly used. DTaP is given to children younger than 7 years of age. It is recommended that children receive 5 doses of DTaP, one dose at each of the following ages: 2, 4, 6, and 15-18 months and 4 through 6 years.

B. Vaccine information – diphtheria, tetanus, and pertussis vaccines (Td and Tdap)

In the United States, Tdap or Td are commonly used in older children and adults. Td is a tetanus-diphtheria vaccine given to adolescents and adults as a booster shot every 10 years, or after an exposure to tetanus under some circumstances. Tdap is similar to Td but also containing protection against pertussis. Tdap can be given no matter when Td was last received.

It is recommended that adolescents* 11 through 18 years of age (preferably at age 11-12 years) receive a single dose of Tdap. One dose of Tdap is also recommended for adults 19 years of age and older who did not get Tdap as an adolescent. Tdap should also be given to 7-10 year olds who are not fully immunized against pertussis.

***Note: children born on or after January 1, 1997 AND who are at least 11 years of age and older (or a comparable age level special education program with an unassigned grade) are required to receive a one-time dose of Tdap vaccine at grade 6 or higher grade level.**

It is recommended that expectant mothers receive Tdap during each pregnancy, preferably at 27 through 36 weeks.

It is recommended that health care workers receive a single dose of Tdap if they have not previously received Tdap as an adult and if they have direct patient contact. Tdap vaccination can protect health care personnel against pertussis and help prevent them from spreading it to their patients. Priority should be given to vaccinating those who have direct contact with babies younger than 12 months of age. For additional guidance, see Evaluating Revaccination of Healthcare Personnel: https://www.cdc.gov/vaccines/vpd/pertussis/tdap-revac-hcp.html

For additional information regarding pertussis vaccination click here: http://www.cdc.gov/vaccines/acip/index.html

Additional Information

Additional information on pertussis can be obtained at the NJDOH Web site at http://www.nj.gov/health/cd/, click on "Diseases & Health Topics A-Z List" and scroll down to "Pertussis."

References

American Academy of Pediatrics. PERTUSSIS (WHOOPING COUGH). In: Kimberlin DW, Barnett ED, Lynfield R, Sawyer MH, eds. Red Book: 2021 *Report of the Committee on Infectious Diseases*. Itasca, IL: American Academy of Pediatrics: 2021 [578-589].

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Hall E., Wodi A.P., Hamborsky J., et al., eds. 14th ed. Washington, D.C. Public Health Foundation, 2021. Available at https://www.cdc.gov/vaccines/pubs/pinkbook/index.html

Centers for Disease Control and Prevention. *Manual for the Surveillance of Vaccine-Preventable Diseases*. Atlanta, GA: Page last reviewed: May 11, 2020. Available at: https://www.cdc.gov/vaccines/pubs/surv-manual/chpt10-pertussis.html

Heymann DL, ed. Control of Communicable Diseases Manual. 20th ed. Washington, DC: American Public Health Association; 2015.