PERTUSSIS
(Whooping Cough)

✓DISEASE AND EPIDEMIOLOGY

Clinical Description

Pertussis is a highly contagious toxin-mediated bacterial disease that interferes with the body's ability to clear pulmonary secretions. Pertussis can be categorized into 3 stages.

- The first, the *catarrhal stage*, is characterized by non-specific respiratory symptoms with a worsening cough. It generally lasts 1-2 weeks.
- The *paroxysmal stage* is where most diagnosis occurs. Symptoms include sudden, severe coughing fits (paroxysms). These fits are often followed by a high-pitched whoop when the person breathes in. Persons may become cyanotic due to a lack of oxygen, and may vomit after a coughing fit. Infants and children generally have the most severe symptoms. In children less than 6 months of age, the most common symptom is apnea, and the whoop is often absent. Older children and adults may also lack the whoop, with a prolonged cough as the most common symptom. This paroxysmal stage can last for 1-6 weeks, sometimes lasting as long as 10 weeks.
- In the *convalescent stage*, the patient gradually recovers from the disease.

Subsequent respiratory infections may elicit paroxysms for months after the onset of pertussis. Milder disease is often seen in adolescents and adults and those who are partially protected because of vaccination.

Infants younger than 12 months are at the greatest risk of complications from pertussis infection and of those that become infected about half are hospitalized and approximately 1.6% will die. Bacterial pneumonia is the most common complication and cause of pertussis-associated deaths. The lack of oxygen caused by coughing can produce neurological disorders like seizures and encephalopathy (a dysfunction of the brain). Other complications include otitis media (ear infection), anorexia (loss of appetite), and dehydration. Complications resulting from pressure effects of severe paroxysms include pneumothorax (collection of gas or air in the chest cavity), epistaxis (nosebleed), subdural hematomas (swelling or mass of blood under the outer membrane covering the spinal cord), hernias (protrusion of organ through wall), and rectal pro lapse (protrusion of rectal mucosa though the anus). Adolescents and adults may suffer from difficulty sleeping, urinary incontinence, pneumonia, and rib fracture.

Causative Agent

Pertussis is caused by *Bordetella pertussis*, a fastidious, gram-negative bacterium.

Differential Diagnosis

Typically, viruses cause upper respiratory infections/bronchitis. The frequency of pertussis as a cause of upper respiratory infection with prolonged cough varies, but can range from 5-20%. Other bacterial pathogens causing upper respiratory illnesses include *Bordetella parapertussis, Mycoplasma pneumoniae, Chlamydia trachomatis, Chlamydia pneumoniae, Bordetella bronchiseptica* and certain adenoviruses.

Laboratory Identification

Laboratory testing of pertussis can guide both clinical and public health responses. Pertussis can be easily missed and confused with other causes of chronic cough, so laboratory testing is useful in appropriate diagnosis. Additionally, laboratory data can significantly contribute to public health's ability to recognize an outbreak. However, laboratory testing can often be difficult, expensive, and may not be clinically useful. Laboratory testing may not be necessary in settings where the patient has clinically compatible symptoms and has exposure to a confirmed case, or where there is a documented outbreak in the community. Public health's recommendation for laboratory testing of individual cases should carefully consider the above circumstances, and should recognize that in certain situations, testing may not be necessary.

Serology

Serologic diagnosis requires paired acute and convalescent sera and therefore it is not recommended for diagnosis due to the wait for convalescent sera. The use of a single serum specimen for diagnostic purposes is not well standardized outside of a research setting. Serology is best used to evaluate a person's immune response to vaccination. Serological tests should **never** be used as the sole laboratory method of pertussis diagnosis.

DFA

While the speed of this test is appealing to determine antibiotic therapy, the sensitivity and specificity of this test are unacceptable. The majority of adults with pertussis will have negative DFA results.

PCR

Currently, this test is the best option in most clinical circumstances. Specimens may be collected 0-3 weeks following cough onset but may provide accurate results up to 4 weeks after cough onset. This test provides acceptable sensitivity in children and adults, has a relatively short turnaround time, and is available at most commercial reference laboratories. Nasopharyngeal swabs and aspirates are the preferred method for specimen collection. PCR results may not be reliable after 5 days of appropriate antibiotic treatment. After the fourth week of cough bacterial DNA rapidly diminishes which increases the risk of false negative results.

NOTE: NP swabs have thin wire shafts and are flexible. You cannot collect an NP specimen with a throat swab. Throat swabs and cough plates are not acceptable specimens.

Culture

Culture is the gold standard for pertussis diagnosis. However, it is highly specific only in the initial stages of disease (during first 2 weeks of cough), and the sensitivity varies widely. Additionally, the length of time to obtain results makes it unacceptable for determining patient therapy. Nasopharyngeal swabs and aspirates are the preferred method for specimen collection. Pertussis DFA or PCR testing is always recommended in addition to culture.

Generally this test may be used when:

- Using an on-site laboratory (transport decreases yield)
- Patients have not started taking antibiotics
- Patients are within two weeks of symptom onset
- Determining possible antibiotic resistance.

Utah Public Health Laboratory (UPHL): All isolates must be submitted to UPHL.

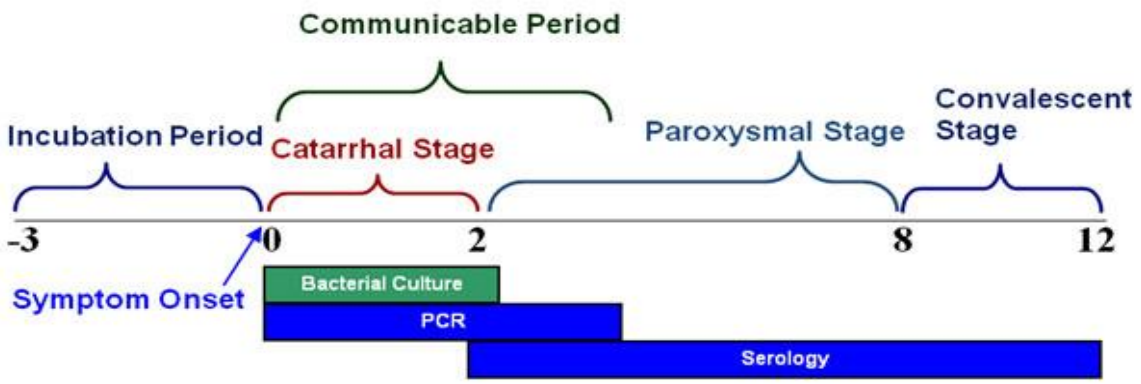
Testing & Timing

Since culture is considered the gold standard, it is particularly important to isolate the bacterium and confirm the pertussis diagnosis if an outbreak is suspected. Many other respiratory pathogens have similar clinical symptoms to pertussis and co-infections are common. Culture will help identify strains of *Bordetella pertussis*. Identifying which strains of *Bordetella pertussis* are causing disease is of public health importance. PCR allows for confirmation and speciation among *Bordetella* species. Results should be interpreted along with the clinical symptoms and epidemiological information. PCR tests vary in specificity, so obtaining culture confirmation of pertussis for at least one suspicious case is recommended any time there is suspicion of a pertussis outbreak.

Serologic assays can be useful for confirming diagnosis, especially during suspected outbreaks. There are many different serologic tests used in laboratories. Generally, serologic tests are more useful for diagnosis in later phases of the disease.

Culture must be taken from NP aspirates collected between 0 to 2 weeks post symptom onset. PCR should ideally be tested from NP aspirates taken at 0-2 weeks, but may provide accurate results for up to 4 weeks in infants or unvaccinated persons. For serology, the optimal timing for specimen collection is at 2 to 8 weeks post symptom onset, when the antibody titers are at their highest; however, serology may be performed on specimens collected up to 12 weeks post symptom onset.

UPHL offers testing of pertussis through the film array multiplex PCR platform. The film array test includes several other tests in addition to pertussis. Only NP swabs sent in viral transport media and kept refrigerated will be accepted for testing of pertussis. Contact UDOH Epidemiology or UPHL to coordinate sample submission.



Treatment

While antibiotics will eradicate the carriage of *Bordetella pertussis*, thereby decreasing communicability, the extent to which antibiotics reduce the duration and severity of illness is unknown. It is widely believed that antibiotics started early in the course of illness are more likely to reduce the illness duration and severity than antibiotics started late in the course of illness. Public health recommends limiting antibiotic treatment to those who are within three weeks of the onset of their illness unless they are:

- Infants less than 1 year of age
- Pregnant women
- Patients with ongoing, close contact with infants less than 1 year of age or pregnant women (e.g., parents and caregivers of infants, daycare workers, pediatricians)

Therapy recommended by the CDC in the 2005 revision of Guidelines for Control of Pertussis Outbreaks, and in the 2009 Red Book:

Drug	Infants <1 month	Children 1-5 months	Children ≥ 6 months	Adults
Azithromycin **Consider alternative for patients with cardiovascular disease**	10 mg/kg per day in a single daily dose for 5 days **Recommended treatment**	10 mg/kg per day in a single daily dose for 5 days	10 mg/kg in a single dose on day 1(maximum 500 mg); then 5 mg/kg per day in a single dose on days 2-5 (maximum 250 mg/day)	500 mg in a single dose on day one; then 250 mg per day in a single dose on days 2-5
Erythromycin	40-50 mg/kg per day in 4 divided doses for 14 days **Monitor for IHPS**	40-50 mg/kg per day in 4 divided doses for 14 days	40-50 mg/kg per day in 4 divided doses for 14 days (maximum 2 g/day)	2 g per day in 4 divided doses for 14 days
Clarithromycin	Not recommended	15 mg/kg per day in 2 divided doses for 7 days	15 mg/kg per day in 2 divided doses for 7 days (maximum 1 g per day)	1 g per day in 2 divided doses for 7 days
TMP/SMZ	Contraindicated for infants < 2 months	Contraindicated for infants < 2 months; for infants aged ≥ 2 months, 8 mg/kg per day (TMP), 40 mg/kg per day (SMZ) in 2 divided doses for 14 days	8 mg/kg per day (TMP), 40 mg/kg per day (SMZ) in 2 divided doses for 14 days	200 mg per day (TMP), 1,600 mg per day (SMZ) in 2 divided doses for 14 days

Resistance to macrolides is rare. Penicillin-class drugs and first/second generation cephalosporins are not effective. Susceptibility testing is generally not done.

Case Fatality

In vaccinated populations, the fatality rate is very low (approximately 1% in infants younger than 2 months of age and less than 0.5% in infants 2-11 months of age). Fatalities typically are only seen in children under the age of 6 months. In unvaccinated populations, morbidity can be significant, but mortality is rare with appropriate medical

care. However, because most of reported pertussis cases in infants are hospitalized, complication rates are likely to be representative of more severe illness.

Reservoir

Humans are the only known hosts of *B. pertussis.* Adolescents and adults are an important reservoir for *B. pertussis* and are often the source for infants.

Transmission

Pertussis is transmitted via close contact with aerosolized droplets of respiratory secretions from infected persons. Transmission can also occur through contact with infected fomites. This disease is not thought to have airborne transmission. Pertussis is highly communicable, with secondary attack rates in susceptible household contacts as high as 90%. The majority of infectious patients are symptomatic; asymptomatic transmission is rare.

Incubation Period

The incubation period for pertussis is 7-10 days, with a range of 6-21 days.

Period of Communicability

Patients are most contagious during the catarrhal stage and the first two weeks after cough onset (approximately three weeks from the initial onset of symptoms). Patients are considered non-infectious following 5 days of antibiotic therapy.

Susceptibility

Susceptibility is universal in unimmunized persons. Females have a higher incidence of disease and mortality. Pertussis immunity typically wanes 5-12 years after vaccination or natural infection.

Epidemiology

Outbreaks of pertussis typically occur every 3-4 years. The highest annual incidence of pertussis occurs among unvaccinated children aged <5 years. Secondary attack rates are approximately 80% to 90% among susceptible household contacts.

Recently, both national and Utah trends demonstrate an increasing age in pertussis cases. It is unclear whether this is a real trend, or if it is due to increased recognition, diagnosis, and reporting of pertussis in adolescents and adults. It is hypothesized that widespread use of pertussis vaccine in children may be responsible for the shift in reported cases to adolescents/adults. In vaccinated populations, fewer mothers have acquired immunity through natural infection and may be less likely to provide passive immunity to an infant through transfer of maternal antibody. This leaves children under the age of one year as a highly, at-risk population. The greatest burden of disease is in this population with an incidence rate of 193 cases per 100,000 population in 2013. Pertussis incidence in adolescents between the ages of 11 and 18 years is 99.8 per 100,000 person-years (n=366) compared to the statewide incidence rate of 45.1 cases per 100,000 population in 2013.

Pertussis rates have been on the rise since 2009, as seen in figure 1 below. Cases reported in Utah 2013 totaled 1309, indicating a decrease in activity over the past year. Figure 2 below shows the total number of cases reported nationally including 2013 provisional data that results in a 7.3 cases per 100,000 population, national incidence rate.

Provisional pertussis data in 2014 indicates a continuation of the downward trend in reported cases seen in 2013. Weekly reports addressing the current situation are located on the UDOH website at http://health.utah.gov/epi/diseases/pertussis/index.html.

Figure 1

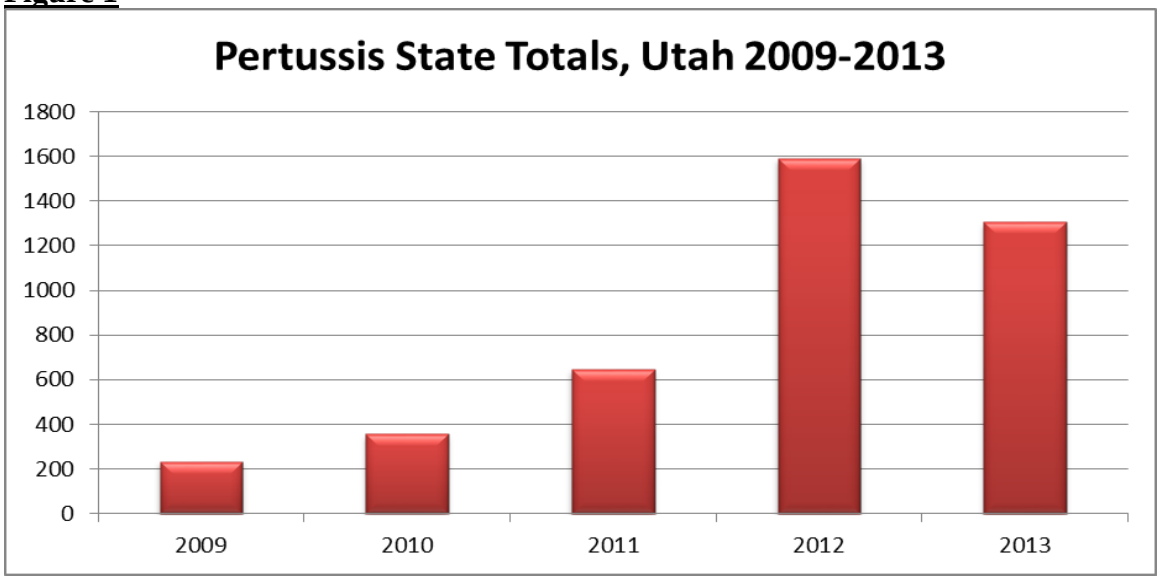
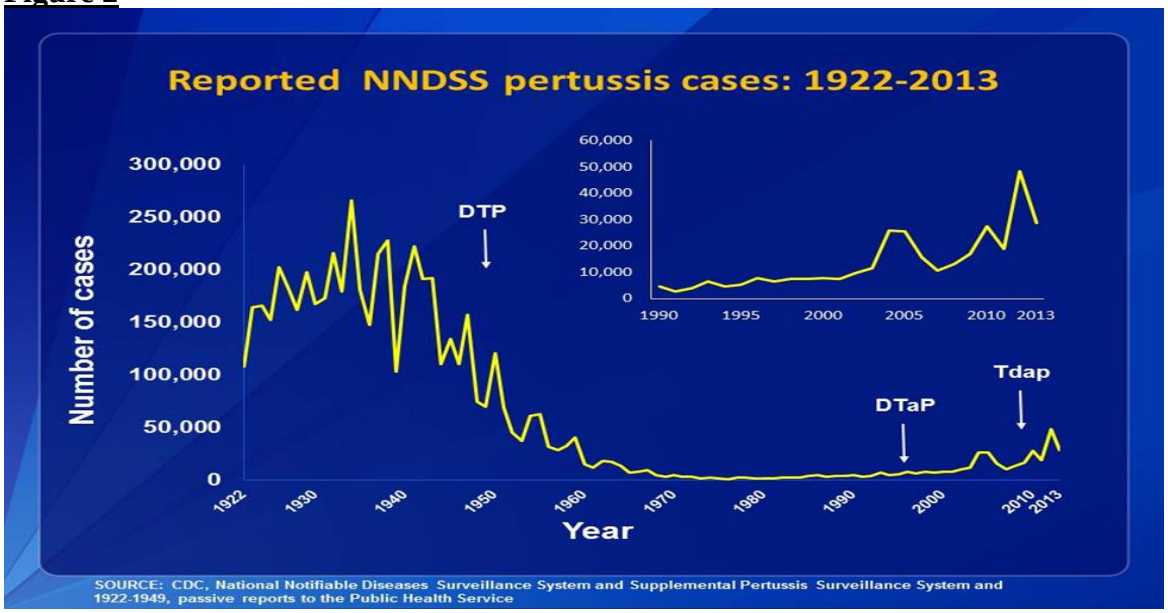


Figure 2



✓PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

- Prevent illness in high-risk individuals through disease investigation, administration of vaccine, and antimicrobial prophylaxis.
- Promote vaccination to reduce disease burden in the community.
- Provide education to the general public (regarding disease transmission) and to clinicians (regarding disease diagnosis, reporting, and prevention).
- Monitor disease trends.

Prevention

The primary method of pertussis prevention is through vaccination.

Chemoprophylaxis

Prophylactic antibiotics may reduce secondary transmission in household and other settings. However, due to the lack of evidence supporting this conclusion, the high numbers of pertussis cases occurring despite widespread antibiotic chemoprophylaxis, and the risk of antibiotic resistance developing due to overuse of antibiotics, UDOH recommends focusing efforts to provide chemoprophylaxis on high-risk contacts and household contacts within the appropriate time frame.

Chemoprophylaxis of all household and close contacts is recommended regardless of their age and vaccination status. Initiating chemoprophylaxis >3 weeks after exposure has limited benefit for the contacts. However, chemoprophylaxis should be considered for high-risk contacts (e.g., infants) **up to 6 weeks after exposure**.

High-risk contacts include:

- Infants less than 1 year of age
- Pregnant women
- Contacts who work with high-risk individuals (e.g., childcare workers, healthcare workers with direct patient contact, etc.)
- All persons with pre-existing health conditions that may be exacerbated by a pertussis infection
- Inadequately immunized schoolchildren 7 years of age

NOTE: Other contacts can be provided antibiotics at the discretion of the Local Health Authority.

Vaccine

Diphtheria vaccine is complexed with acellular pertussis and tetanus toxoid, also known as DTaP. Immunization should be initiated in infancy. The first 3 doses are given at 4-8 week intervals beginning at 6-8 weeks of age; a fourth dose should be 6-12 months after the third dose; and a fifth dose given at 4-6 years of age, but prior to school entry. This dose is not necessary if the fourth dose is given at 4 years of age or later.

The Advisory Committee on Immunization Practices (ACIP) recommends a single Tdap dose for persons aged 11 through 18 years who have completed the recommended childhood diphtheria and tetanus toxoids and pertussis/diphtheria and tetanus toxoids and acellular pertussis (DTP/DTaP) vaccination series and for adults over 19 years of age who have not previously received Tdap. ACIP recommends that children aged 7 through 10 years of age who are not fully vaccinated* against pertussis and for whom no contraindication to pertussis vaccine exists should receive a single dose of Tdap to provide protection against pertussis. In February 2013, ACIP issued the recommendation that pregnant women should be vaccinated with Tdap during every pregnancy, regardless of previous vaccination with Tdap. Tdap may be administered any time during pregnancy, but vaccination during the third trimester would provide the highest concentration of maternal antibodies to be transferred closer to birth. Tdap is also recommended by ACIP to be given as a replacement booster dose for the tetanus and diphtheria toxoids vaccine (Td), which should be given every 10 years. ACIP also recommends that all adolescents and adults who anticipate close contact with an infant <12 months receive a dose of Tdap if they have not previously received one. For additional information about who should receive the Tdap vaccine and when, go to:
http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule.pdf
For updated 2014 recommendations by ACIP, go to:
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6207a4.htm

*Fully vaccinated is defined as 5 doses of DTaP or 4 doses of DTaP if the fourth dose was administered on or after the fourth birthday.

Isolation and Quarantine Requirements

Isolation: Non-hospitalized patients with pertussis should remain out of school or childcare settings until they have received five days of appropriate antibiotic therapy, or, if not treated, until 21 days after the onset of symptoms. Voluntary isolation from work and other settings where close contact may transmit the disease is desirable. Such restriction of activity would be very difficult to legally enforce if involuntary.

Hospital: Hospitals should follow droplet precautions for five days of appropriate antibiotic therapy, or, if not treated, until 21 days after the onset of symptoms.

Quarantine: Susceptible contacts should remain out of school or childcare settings until 21 days after their last exposure or until the case and contacts have received 5 days of appropriate antibiotics.

R396-100-8. Exclusions of Students Who Are Under Exemption and Conditionally Enrolled Status.

(1) A local or state health department representative may exclude a student who has claimed an exemption or who is conditionally enrolled from school attendance if there is good cause to believe that the student has a vaccine preventable disease and:

(a) has been exposed to a vaccine-preventable disease; or

(b) will be exposed to a vaccine-preventable disease as a result of school attendance.

(2) An excluded student may not attend school until the local health officer is satisfied that a student is no longer at risk of contracting or transmitting a vaccine-preventable disease.

✓CASE INVESTIGATION

Reporting: Reference Appendix 1

If pertussis is suspected, it should be reported to the local health department or the Utah Department of Health.

Case Definition

Pertussis *(Bordetella pertussis)* (Whooping Cough) (2014)

Clinical Case Definition

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) (FOR INFANTS AGED <1 YEAR ONLY)

Laboratory Criteria

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

Case Classification: Reference Appendix 2

Probable

- 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) (FOR INFANTS AGED <1 YEAR ONLY)

and

        - Absence of laboratory confirmation;

and

        - No epidemiologic linkage to a laboratory-confirmed case of pertussis.

OR, FOR INFANTS AGED <1 YEAR ONLY:

- Acute cough illness 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

        - Polymerase chain reaction (PCR) positive for pertussis.

OR, FOR INFANTS AGED <1 YEAR ONLY:

- Acute cough illness 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 of pertussis.

Confirmed

- Acute cough illness of any duration, with isolation of *B. pertussis* from a clinical specimen.

OR

- 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) (FOR INFANTS AGED <1 YEAR ONLY)

and

    - Polymerase chain reaction (PCR) positive for pertussis.

OR

- 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) (FOR INFANTS AGED <1 YEAR ONLY)

and

    - Contact with a laboratory-confirmed case of pertussis.*

Case Classification Comment(s)
*Note: An illness meeting the clinical case definition should be classified as "probable" rather than "confirmed" if it occurs in a patient who has contact with an infant aged <1 year who is Polymerase Chain Reaction (PCR) positive for pertussis and has ≥1 sign or symptom and cough duration <14 days (classified as "probable" case).

Comment
The clinical case definition above is appropriate for endemic or sporadic cases. In outbreak settings, a case may be defined as a cough illness lasting at least 2 weeks (as reported by a health professional). Because direct fluorescent antibody testing of nasopharyngeal secretions has been demonstrated in some studies to have low sensitivity and variable specificity (5, 6), such testing should not be relied on as a criterion for laboratory confirmation. Serologic testing for pertussis is available in some areas but is not standardized and, therefore, should not be relied on as a criterion for laboratory confirmation. Both probable and confirmed cases should be reported nationally.

Case Investigation Process
Cases of pertussis should be managed as follows:

- Encourage appropriate laboratory testing.
- Ensure appropriate antibiotic treatment.
    - Generally recommended for those who are within three weeks of the onset of their illness.
    - Infants less than 1 year of age, pregnant women, and persons with ongoing, close contact with infants less than 1 year of age or pregnant women (e.g., daycare workers, pediatricians) should be treated regardless of duration.
- Isolation should be imposed until 21 days after the onset of symptoms or 5 days after appropriate antibiotic therapy is begun.
- All case contacts should be identified and appropriately managed (explained in detail below).
- The investigation of cases should be finalized at the local health department in UT-NEDSS 2 weeks after the onset date to ensure the appropriate case status is assigned, according to the CSTE case definition. In many cases this will require some follow up after the initial interview, depending on date of onset and when interview is conducted.
- In the investigation form there is a question regarding up to date vaccination status that is for public health investigators to answer, not the patient/guardian being interviewed. This question should be answered based on the information about vaccine history provided and the age of the patient being interviewed. A case is considered up to date under the following circumstances:
    - 2 months of age = 1 DTaP
    - 4 months of age = 2 DTaP
    - 6 months of age = 3 DTaP
    - 15-18 months of age = 4 DTaP
    - 4-6 years of age = 5 DTaP (optional booster dose)
    - 10+ years of age = 1 dose of Tdap

A case is considered vaccinated when official vaccination records are presented (e.g., USIIS records, MD chart etc). Anecdotal reports or verbal reports from patients or guardians of vaccination are not considered documentation.

Outbreaks

Formally, an outbreak is defined as 2 or more cases within 20 days of each other, AND one of these cases must be laboratory confirmed. UDOH, in collaboration with local health departments, has developed an outbreak guidelines document for use during an outbreak in schools and other childcare settings. These outbreak recommendations were developed to provide statewide consistency in situations involving pertussis outbreaks. The purpose of these guidelines is to provide effective management tools for pertussis outbreak situations. The primary goal of pertussis outbreak control efforts is to decrease morbidity (amount of disease) and mortality (death) among infants (children <1 year of age). A secondary goal is to decrease morbidity among persons of all ages. A unified approach across the state will ensure public health messaging and actions regarding pertussis are clear and consistent to aid in the prevention of pertussis. See outbreak guidelines document found at http://health.utah.gov/epi/diseases/pertussis/index.html.

Declaration of an outbreak can be useful to elicit media coverage and support from physicians for improved interventions including case detection, reporting, and administration of prophylaxis and treatment. When an outbreak is declared, additional public health resources may need to be allocated to control the situation.

Identify Case Contacts

Close contacts are defined as persons who share a confined space (<6 feet) for more than 1 hour with the patient during the infectious period (defined as a three week period, starting from the onset date identified above). Consider members of the following groups:

- Household and immediate family members (those who spend many hours together or sleep under the same roof)
- Those who have direct contact with respiratory secretions
- Healthcare workers with extensive face-to-face contact with a patient who is coughing
- Core groups of close friends, social contacts, boyfriends, girlfriends
- Students sitting within 3 feet at school
- Contacts at church activities and employment
- Participants in extracurricular activities (such as fieldtrips); and
- Children attending after-school care or a playgroup

Case Contact Management

Asymptomatic Contacts

Chemoprophylaxis

Assure the following high risk contacts receive chemoprophylaxis:

- Infants less than 1 year of age
- Pregnant women
- Contacts who work with high-risk individuals (e.g., child care workers, healthcare workers with direct patient contact, etc.)

- All persons with pre-existing health conditions that may be exacerbated by a pertussis infection
- Inadequately immunized school children less than 7 years of age; and
- Individuals, including parents and siblings, living in the same household with other high-risk contacts

Vaccination

For close contacts **<7 years of age** of pertussis cases:

- Assess immunization status
- Recommend a fourth dose be given to all children who have received their third dose of DTaP 6 months or more before the exposure
- Recommend a booster be given to all children who have received four doses of DTaP, unless the fourth dose was given in the past 3 years
- *Note: Asymptomatic contacts less than 7 years of age that have not received at least three doses of DTaP before the exposure shall be excluded from school/child care unless they elect to receive chemoprophylaxis*

For close contacts **7-10 years of age** of pertussis cases:

- Tdap vaccine is recommended at age 11 or 12, however, if a child has not received any or all of the DTaP vaccine series, they may receive a single dose of Tdap when they are 7 -10 years old as part of their catch-up series.

For close contacts (10-18 years of age) of pertussis cases:

- Recommend vaccination with Tdap
- A 5-year interval between TD and Tdap is safe, but may cause a higher risk of local or systemic reactions; Tdap may be given after a shorter interval when the risk of transmission outweighs the risk of a reaction
- Adolescents with history of pertussis should still receive the vaccine
- *Note: There is only one vaccine approved for 10 year olds.*

For close contacts **>18 years of age** of pertussis cases:

- Advise people of the availability of a licensed vaccine for adults
- ACIP recommends adults aged 19 years and older receive a single dose of Tdap to replace a single dose of Td for booster immunization
- Tdap may be given at an interval shorter than 10 years since receipt of last tetanus-toxoid containing vaccine to protect against pertussis (interval as short as approximately 2 years)
- Adults who have or will have close contact with an infant <12 months of age should receive a single dose of Tdap
- Pregnant women should be given a Tdap vaccination during each pregnancy. Tdap may be administered any time during pregnancy, but vaccination during the third trimester would provide the highest concentration of maternal antibodies to be transferred closer to birth.
- Tdap products in adults aged 65 years and older. Providers should not miss an opportunity to vaccinate persons aged 65 years and older with Tdap. Therefore, providers may administer the Tdap vaccine they have available. When feasible, Boostrix should be used for adults aged 65 years and older; however, ACIP concluded that either vaccine administered to a person 65 years or older is immunogenic and would provide protection. A dose of either vaccine may be considered valid. (June, 2012 ACIP recommendation).

Symptomatic Contacts

- Recommend all symptomatic contacts obtain medical evaluation including confirmatory laboratory testing and antibiotic treatment if pertussis is identified.
- If symptomatic contacts refuse to obtain medical evaluation, consider providing antibiotic therapy.

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UT-NEDSS Minimum/Required Fields by Tab

Pertussis

MORBIDITY EVENT

Demographic

- ☑ Last Name
- ☑ Street
- ☑ Unit Number
- ☑ City
- ☑ State
- ☑ County
- ☑ Zip Code
- ☑ Date of Birth
- ☑ Area Code
- ☑ Phone Number
- ☑ Birth Gender
- ☑ Ethnicity
- ☑ Race

Clinical

- ☑ Disease
- ☑ Onset Date
- ☑ Date Diagnosed
- ☑ Died
- ☑ Date of Death
- ☑ Seizures
- ☑ Did cough last at least two weeks?
- ☑ Did patient have paroxysmal cough?
- ☑ Did patient have inspiratory whoop?
- ☑ Did patient have post-tussive vomiting?
- ☑ Did patient have apnea?
- ☑ Did patient have acute encephalopathy?
- ☑ Has patient ever received a pertussis-containing vaccine?
  - (if yes) Date of last pertussis-containing vaccine:

Laboratory

- ☑ Test Type
- ☑ Organism
- ☑ Test Result
- ☑ Specimen Source

Epidemiological

- ☑ Health Care Worker
- ☑ Group Living
  - (if yes) Name and location of group living:
  - (if yes) Has case been excluded from the facility for the first 5 days of antibiotics or 21 days after cough onset if antibiotics were not taken?
  - (if yes) Has the facility staff been alerted to watch for symptoms in contacts for 21 days after the last exposure?
- ☑ Day Care Association
  - (if yes) Name and location of daycare:
  - (if yes) Has case been excluded from daycare for the first 5 days of antibiotics or 21 days after cough onset if antibiotics were not taken?
  - (if yes) Has the daycare staff been alerted to watch for symptoms in contacts for 21 days after the last exposure?
- ☑ Attends School
  - (if yes) Name and location of school:
  - (if yes) Has case been excluded from school for the first 5 days of antibiotics or 21 days after cough onset if antibiotics were not taken?
  - (if yes) Has school administration been alerted to watch for symptoms in contacts for 21 days after the last exposure?
- ☑ Imported from
- ☑ Is this case epi-linked to anyone?
  - (if yes) List name:

Reporting

- ☑ Date first reported to public health

Administrative

- ☑ State Case Status (completed by UDOH)
- ☑ Outbreak Associated
- ☑ Outbreak Name

Appendix 1: CSTE Reporting Swim lane

Criterion	Reporting			
Clinical Evidence				
Cough (any duration)	**N**		**N**	
Cough ≥2 weeks duration				
Inspiratory whoop	**N**			
Healthcare record contains diagnosis of pertussis				**S**
Death Certificate lists pertussis as a cause of death or a significant condition contributing to death				**S**
Laboratory Evidence				
Isolation of *B. pertussis* from a clinical specimen		**S**		
Positive for PCR		**S**		
Epidemiological Evidence				
Contact with a lab-confirmed pertussis case			**O**	
Member of a defined risk group during an outbreak			**O**	

Notes:
S= This criterion alone is Sufficient to report a case.
N= All "N" criteria in the same column are Necessary to report a case.
O= At least one of these "O" (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column-in conjunction with all "N" criteria in the same column-is required to report a case.
*A requisition or order for any of the "S" laboratory tests is sufficient to meet the reporting criteria.

Reporting Swim lane description:

Swim lanes are a visual representation of the reporting requirements. Classification is obtained by meeting all distinct criterion under each criterion category with-in one swim lane. Each criterion (rows) identified within a swim lane (column) is required to be met to fulfill the need of the reporting requirement. Follow the notes section for guidance.

Appendix 2: CSTE Case Classification Swim lane

Criterion	Confirmed			Probable			
	1	2	3	1	2 (<1 Year only)	3 (<1 Year only)	4
Clinical Evidence							
Acute cough illness (any duration)	**N**				**N**	**N**	
Cough ≥2 weeks duration		**N**	**N**	**N**			**N**
Inspiratory whoop		**O**	**O**	**O**	**O**	**O**	**O**
Paroxysms of coughing		**O**	**O**	**O**	**O**	**O**	**O**
Post-tussive vomiting		**O**	**O**	**O**	**O**	**O**	**O**
Apnea (with or without cyanosis) (for		**O**	**O**	**O**	**O**	**O**	**O**

infants < 1 year of age only)							
Laboratory Evidence							
Isolation of B. pertussis from a clinical specimen	**N**						
Positive for PCR		**N**			**N**		
Epidemiological Evidence							
Contact with a laboratory confirmed case (classified as "confirmed")			**N**			**O**	
Contact with a laboratory confirmed infant case (classified as "probable")						**O**	**N**

Notes:
S= This criterion alone is Sufficient to classify a case.
N= All "N" criteria in the same column are Necessary to classify a case. A number following an "N" indicates that this criterion is only required for a specific disease/condition subtype (see below).
O= At least one of these "O" (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column-in conjunction with all "N" criteria in the same column- is required to classify a case. (these optional criteria are alternatives, which means that a single column will have either no O criteria or multiple O criteria; no column should have only one O.) A number following an "O" indicates that this criterion is only required for a specific disease/condition subtype.

Classification Swimlane description:

Swim lanes are a visual representation of the classification requirements. Classification is obtained by meeting all distinct criterion under each criterion category with-in one swim lane. In the criterion column there are italicized criterion categories. Each criterion (rows) identified within a swim lane (column) is required to be met to fulfill the need of the classification status (column header). Each column header is labeled 1-3 (confirmed) and 1-4 (probable). Each column header is unique to how it reaches the case classification and each must meet the required criterion independently to fit into the proper classification. Follow the notes section for guidance.