Pertussis

Investigative Guidelines

November 2018

1. DISEASE REPORTING

1.1 Purpose of Reporting and Surveillance

1. To prevent illness and death among exposed, high-risk persons.
2. To vaccinate exposed, under-immunized children.
3. To educate exposed persons about the signs and symptoms of pertussis in order to facilitate prompt diagnosis and treatment and prevent further spread.
4. To monitor the epidemiology of pertussis in Oregon.

1.2 Laboratory and Physician Reporting Requirements

Physicians are required to report cases (including suspect cases) within one working day (OAR 333-018- 0015[5C]). Licensed labs must similarly report within one working day of identification or initial positive test report to the requesting physician (OAR 333-018-0015[4]).

1.3 Local Health Department Reporting and Follow-Up Responsibilities

1. Begin routine case investigation within one working day.
2. Identify and evaluate contacts; educate and recommend measures to prevent further spread.
3. Report all confirmed and presumptive (but not suspect) cases to the Acute and Communicable Disease Prevention program (ACDP) as soon as possible, but no later than the end of the calendar week of the initial physician/lab report. Submit all case data electronically.

2. THE DISEASE AND ITS EPIDEMIOLOGY

2.1 Etiologic Agent

Bordetella pertussis, a fastidious pleomorphic Gram-negative bacillus.

2.2 Description of Illness

Classic pertussis, whooping cough, is characterized by spasms of severe coughing (paroxysms) lasting from 6–10 weeks. Pertussis should be suspected when any cough is paroxysmal or lasts more than a week. Pertussis typically lacks fever and classically progresses through three stages:

1. Catarrhal (1–2 weeks): mild, upper respiratory tract symptoms gradually develop with an intermittent non-productive cough.

2. Paroxysmal (1–2+ weeks): spasms of cough end with a gasp, whoop, or vomiting (post-tussive emesis). Adolescents and adults may have less dramatic symptoms.
3. Convalescent (2–6+ weeks): gradual resolution of the paroxysmal coughing.

Pertussis can occur at any age, regardless of vaccination history. The differential diagnosis of pertussis includes other respiratory pathogens such as adenoviruses, *Bordetella parapertussis*, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and respiratory syncytial virus. Apnea rather than cough may be the initial or most important symptom in infants less than 6 months of age. A clue to the diagnosis in **infants only** is an elevated white blood count (over 15,000/mm^3) with a predominance of lymphocytes. Pertussis among older children, adults, and those previously immunized can be milder than classic whooping cough; the symptoms may be no more distinctive than other upper respiratory tract infections.

Death and serious complications including apnea, malnutrition, pneumonia, pulmonary hypertension, seizures, and encephalopathy occur mainly in infants. Older individuals may suffer from sleep deprivation, sweating, syncope, rib fractures, hernia, and incontinence.

B. parapertussis is a less common, non-reportable infection requiring no public health action. Parapertussis symptoms are similar but milder than pertussis, and serious complications are rare. *B. pertussis* infections provide little cross-protection against subsequent infection with the *B. parapertussis* and vice versa; pertussis vaccine does not prevent parapertussis. *Bordetella holmesii* has been associated most often with sepsis in patients with underlying conditions. *B. bronchiseptica* is rare in humans. We recommend that reports of *parapertussis*, *holmesii* and *bronchiseptica* infection not be investigated further, and we do not recommend chemoprophylaxis for close contacts to be given. The decision to treat patients with these non-*pertussis Bordetella* infections may be left to the clinician's judgment.

2.3 Reservoirs

Humans.

2.4 Modes of Transmission

B. pertussis is transmitted person to person through direct contact with respiratory secretions or via droplets produced from a cough or sneeze. The precise duration and intensity of exposure needed to cause infection is unclear; an hour or more in a confined space with a contagious individual is generally felt to be a significant exposure. Some individuals, especially infants, may remain culture-positive for several weeks. There is no chronic carrier state.

2.5 Incubation Period

Typically, 7–10 days (range 4–21 days).

2.6 Period of Communicability

Pertussis is highly contagious. Persons with pertussis are most infectious during the catarrhal period (i.e., approximately 1 week) and the first 2 weeks after cough onset (i.e., approximately 21 days total); some individuals, particularly infants, may be infectious for a longer period. Secondary attack rates are 25-60% among household contacts in the developed world and reach 80% among fully susceptible persons (i.e., neither immunized nor previously infected).

2.7 Immunity

The duration of immunity after natural infection with *B. pertussis* is unknown and probably variable. Second infections have been reported within months after the first infection. Efficacy of the "whole-cell" vaccine was 70–90%, but after 4–12 years protection waned. The acellular vaccine series (recommended in the U.S. for the entire series since 1997) has an efficacy of approximately 80–90% in young children but immunity also appears to wane over a similar timeframe. A 2010 study conducted in California found that the vaccine is very effective (98%) for children who received their 5th DTaP within the prior 12 months. Then there is a modest decrease in effectiveness each subsequent year from the last shot. At 5 years or longer the effectiveness was estimated to be around 71%.[1] Similarly, the immunity offered by Tdap wanes over time. A 2012 study conducted in Washington State, showed that vaccine effectiveness (VE) within 1 year of vaccination was 73%. At 2 to 4 years post vaccination, VE declined to 34%.[2]

3. CASE DEFINITIONS, DIAGNOSIS AND LABORATORY SERVICES

3.1 Close Contacts

Close contacts are defined to include immediate family members (those who spend many hours together or sleep under the same roof) and anyone who had direct contact with respiratory secretions. Although obviously these are somewhat arbitrary distinctions, "close contacts" should also include those who shared confined space (within ~6 feet) for >1 hour during the communicable period. These might include, for example, close friends and other social contacts in childcare, school, or work settings; co-participants in certain extra- curricular activities or outings; and healthcare workers caring for a case without wearing a mask. Schoolchildren sitting within ~3 feet of a case (i.e., adjacent seating) can also be included.

High-risk close contacts comprise infants (<1-year-old) and pregnant women in the third trimester.

3.2 Confirmed Case Definition (Reportable to OHA)

- Culture-positive and an acute cough illness of any duration
  or
- PCR-positive and a cough illness lasting at least 2 weeks with any of the following: paroxysms of coughing, inspiratory "whoop", post-tussive vomiting or apnea (for infants only).

Note that swab test results obtained in the absence of symptoms (ouch!) are not considered diagnostic.

3.3 Presumptive Case Definition (reportable to OHA)

- Epidemiologically linked to a case confirmed by either culture or PCR and a cough illness lasting at least 2 weeks with any of the following: paroxysms of coughing, inspiratory "whoop", post-tussive vomiting or apnea (for infants only).

Consider getting specimens for confirmation of presumptive cases; the results will affect the classification of their symptomatic contacts.

3.4 Suspect Case Definition (*not* reportable to OHA)

- Persons with a compatible illness but neither lab confirmed nor close contact of a confirmed case. A compatible illness is defined as cough lasting ≥14 days *and* at least one of the following: paroxysms of coughing, inspiratory "whoop", post-tussive vomiting or apnea (for infants only);

or

- Person PCR+ or culture-positive for pertussis, but who does not meet either the confirmed or presumptive case definition;

or (for infants only)

- Epidemiologically linked to a case confirmed by either culture or PCR and a cough of any duration with any of the following: paroxysms of coughing, inspiratory "whoop", post-tussive vomiting or apnea.

3.5 Non-pertussis *Bordetella* species

Reports of *parapertussis*, *holmesii* and *bronchiseptica* infection should not be investigated further. However, if one of these species shows up in the Orpheus ELR queue, create a pertussis case, make it "No Case'' and enter the species in the lab section. This will allow us to learn the frequency with which infection by these species is reported.

If, through culture or PCR testing, it is determined that a case-patient is infected with both *B. pertussis* and another *Bordetella* species (e.g., *B. parapertussis, B. holmesii, B. bronchiseptica*), assign status of the pertussis case based on the investigative guideline case definition, and enter the name of the non-*pertussis* species in the lab section for each *Bordetella* lab report.

3.6 Services Available at the Oregon State Public Health Laboratory (OSPHL)

Both culture and PCR are available at the Oregon State Public Health Laboratory (OSPHL). Only patients with signs and symptoms consistent with pertussis should be tested. A properly obtained nasopharyngeal (NP) swab or aspirate is essential for optimal laboratory diagnosis. Complete instructions for properly collecting, storing, and transporting specimens for the OSPHL can be found at: www.healthoregon.org/labtests.

No cost testing for *B. pertussis* is available in the Portland Metropolitan Area through the OSPHL. This testing is part of a special effort, the Metropolitan Area Pertussis Surveillance Program or MAPS, for patients in Clackamas, Multnomah and Washington counties, funded by a grant from the CDC to improve pertussis detection. *B. pertussis* testing is performed for a fee for providers and patients outside of these three counties, unless the testing is related to an identified outbreak.

Culture

Isolation of *B. pertussis* by bacterial culture remains the gold standard for diagnosing pertussis. A positive culture for *B. pertussis* confirms the diagnosis of pertussis. Since culture has excellent specificity, it is particularly useful for confirming pertussis diagnosis when an outbreak is suspected (see 6.3). Culture is best done from NP specimens collected during the first 2 weeks of cough when viable bacteria are present in the nasopharynx. After the first 2 weeks, sensitivity is decreased and the risk of false-negatives increases. Success in isolating the organism declines if the patient has received prior antibiotic therapy effective against *B. pertussis* and if the patient has been vaccinated. Proper specimen collection and handling is imperative to ensure *B. pertussis* recovery and growth in culture. Further, culture recovery of *B. pertussis* supports continuing national analysis of the organism over time to support public health measures.

Polymerase Chain Reaction (PCR)

The Real Time PCR performed by the OSPHL is a molecular technique used to detect the target genes of *B. pertussis*, *B. parapertussis*, and *B. holmesii*. Unlike culture, PCR does not require viable (live) bacteria present in the specimen. PCR has optimal sensitivity during the first 3 weeks of cough when bacterial DNA is still present in the nasopharynx. After the fourth week of cough, the amount of bacterial DNA rapidly diminishes, which increases the risk of obtaining falsely negative results. While PCR is increasingly used as the sole diagnostic test for pertussis, CDC and OSPHL request that PCR be used in conjunction with culture when feasible, rather than as an alternative test. If PCR has been performed by the submitting facility, the OSPHL may perform culture only by indicating this on the test request form.

3.7 Specimen Collection for OSPHL Testing

Collect, store, and transport specimens consistent with the OSPHL Lab Test Menu, available at: www.healthoregon.org/labtests. Appropriate collection kits, test request forms, and mailing containers are available from the OSPHL by completing and submitting the OSPHL Stockroom Order Request Form, available at: http://bit.ly/PHLStockOrder.

A properly obtained nasopharyngeal (NP) swab is the preferred specimen, using a Dacron tip swab on a flexible wire shaft. For culture and PCR, submit an NP swab in Regan-Lowe transport media. Additional specimen sources, detailed on

the OSPHL Lab Test Menu, are accepted but are not preferred. Do not substitute calcium alginate swabs.

Instructions on collecting nasopharyngeal specimens can be found at: https://public.health.oregon.gov/LaboratoryServices/CommunicableDiseaseTesting/Documents/np-collection.pdf.

3.8 Other Laboratory Methods (Not Available at OSPHL)

For culture or PCR performed at a non-OSPHL laboratory, please follow the specimen collection instructions provided by the laboratory that will test the specimen.

Serology. Although serology may have a role in the future, the lack of standardization of these antibody tests and their unknown correlation with pertussis illness limits their current usefulness. No public health action is warranted by sporadic reports of positive serologic tests for pertussis because cases are unlikely to be contagious by the time the tests are reported.

Direct Fluorescent Antibody. DFA was used for *B. pertussis* screening in the past, but lacks sensitivity and specificity. Therefore, use of DFA for *B. pertussis* diagnosis is not currently recommended.

3.9 Susceptibility Testing

Routine susceptibility testing of *B. pertussis* isolates is not recommended since resistance to macrolide antibiotics is rare. Consult with the Immunization Program if a patient has a positive *B. pertussis* culture after completion of an appropriate course of antimicrobial therapy and patient compliance with therapy has been verified.

4. ROUTINE CASE INVESTIGATION

All reported cases should be investigated.

Coughing, PCR-positive cases should be entered as “confirmed” cases, and control measures including treatment, prophylaxis of contacts, and exclusion from school and health-care work or attendance undertaken accordingly. Cases should be called back to determine duration of cough and to elicit any additional symptoms (whoop, paroxysms, post-tussive vomiting). Cases whose coughing resolves after a total of less than 14 days should be downgraded to “suspect.”

4.1 Identify Close Contacts of Confirmed and Presumptive Cases

Identification of close contacts of confirmed and presumptive cases is important for at least three reasons. First, symptomatic contacts may need testing or treatment. Second, high-risk asymptomatic contacts may need prophylaxis. And finally, even low-risk contacts need to be educated about seeking medical care and using respiratory etiquette if symptoms develop.

Close contacts (defined in §3.1) are identified through routine interviews of the case or proxies. Close contacts should be contacted and entered into Orpheus.

The top priority is finding exposed high-risk contacts (infants and pregnant women in the third trimester).

For infant cases <1 year of age, mom should be asked to report her Tdap vaccination status and contact information for any medical provider from whom she may have received vaccinations since 2005. Afterwards, check the immunization registry; if mom has no Tdap information in the registry, contact the provider(s) to ascertain and confirm dates of Tdap administration.

(Note: medical providers are not limited to physician offices and may also include pharmacies, health departments, or any other place the mother may have received a vaccination since 2005. However, pharmacies need be contacted if and only if mom says she's been vaccinated but no such vaccination is recorded in the registry. If mom doesn't recall, and the registry shows no doses, then please check with the docs, but not with pharmacies.)

If coherent groups such as a class or a team are identified as close contacts, it may be helpful to obtain the name and phone number of teachers, principals, or coaches.

Questions sometimes arise about potential risk of transmission via fomites -- e.g., mattresses in a wrestling match. Priority in contact tracing and management should be given to immediate close contacts (high-risk, household, and others meeting "close contact" exposure criteria). Although transmission of pertussis via fomites might theoretically be possible, there are no data demonstrating that it occurs. Cleaning of surfaces contaminated with mucus, saliva, or other body fluids is, of course, always prudent.

4.2 Follow-up with Contacts with Respiratory Symptoms in Order of Priority

Symptomatic contacts of confirmed pertussis cases may meet the presumptive case definition at the time of initial interview and are reportable; like confirmed cases, they should be interviewed. For example, investigation of a smoker with a chronic unchanged cough is less urgent than inquiring after a non-smoking daycare employee with a cough of 7 days duration.

Symptomatic contacts of presumptive and suspect cases are not reportable and do not routinely require contact investigation. At the discretion of the local health authority, some symptomatic contacts may invite further investigation following procedures outlined above.

4.3 Identify the Source of Infection

During the initial interview, ask about contacts with compatible symptoms during the 1–3-week interval prior to onset. Because mild or atypical illness is common, it is not always possible to identify the actual source of infection.

4.4 Environmental Evaluation

The earth *is* getting warmer, but don't worry about it during pertussis investigations.

5. CONTROLLING FURTHER SPREAD

5.1 Treatment of Cases

Early treatment (within 2 weeks of paroxysmal cough onset) is much more effective in preventing secondary spread than treatment started later. Initiating treatment more than 3 weeks after onset of paroxysmal cough is unlikely to be beneficial and should be limited to situations in which there is on-going contact with an infant or a pregnant woman in the third trimester. A reasonable guideline is to treat persons aged >1 year within 3 weeks of cough onset and infants aged <1 year and pregnant women (especially near term) within 6 weeks of cough onset.

5.2 Protection of Contacts

Active Immunization

Exposed children who received their third dose of DTaP 6 months or more before exposure to pertussis should be given a 4th dose at this time. Children who received all four primary doses before their fourth birthday should receive a fifth (booster) dose of DTaP before entering school. Persons 7–9 years of age who have not been fully immunized against pertussis should receive Tdap now. Those ≥10 (including persons ≥65) years of age who have not received Tdap or who received it as part of the primary series catch-up schedule should get it at this time. There is no need to observe any minimum interval between doses of Td and Tdap. A dose of Tdap vaccine should be administered during each pregnancy irrespective of the patient's prior history of receiving Tdap. Optimal timing for Tdap administration in pregnant women is at 27–36 weeks' gestation. If Tdap is not administered during pregnancy, Tdap should be administered immediately post-partum. The postpartum dose is only recommended for women who have not previously received Tdap.

Chemoprophylaxis

Most pertussis in adults and adolescents is neither diagnosed nor reported and antibiotic prophylaxis does not control the transmission of pertussis when it is widespread in the community. The effort to provide antibiotic prophylaxis for pertussis must focus on infants <1 year of age since serious complications and death are limited to this group. Recommend prompt antibiotic prophylaxis within 21 days of exposure for close contacts of confirmed, presumptive, and suspect cases who are:

- Infants;
- Pregnant women in the 3rd trimester (since they will soon have contact with an infant);
- All household contacts of a case if there is an infant or a pregnant woman in the 3rd trimester in the household, even if the infant in the household is the case;

- All those attending or working in a childcare setting (i.e., same room) of a case if there is an infant or one of those same third trimester women in the setting;
- Other contacts at the discretion of the local health department (e.g. pediatric healthcare workers, unimmunized contacts, other pregnant women, high-risk contacts of suspect cases).

5.3 What about Suspect Cases

Suspect cases (contacts or otherwise) are a conundrum. By definition, we don't feel comfortable saying that they probably have pertussis, but at the same time we realize that even though the specificity of this category is low, it is not zero. This presents us with the dilemma of doing too much (wasting time and other resources, exposing people to risks of side effects of prophylaxis, etc.) or doing too little (leading to ongoing transmission and the risk of increased morbidity). This is an inherently grey area, with few obvious choices.

If the person has not had a medical evaluation, and their symptoms are ongoing, then they should be referred to a clinician for assessment, laboratory testing, and consideration of treatment; the clinician should be aware of the reasons for referral to avoid misunderstanding and mutual frustration. Take advantage of the free OSPHL culture and PCR services if these clients cannot afford laboratory testing. Treatment by clinician or by evaluating nurse under standing orders should be strongly considered for patients with compatible symptoms, acute onset cough, and close contact with a case. Feel free to call and consult.

5.4 Education

Advise close contacts of confirmed and presumptive cases of the risk of infection; counsel them to watch for signs or symptoms of pertussis occurring within 21 days of exposure. The method for communicating with contacts will depend on the situation; schools, childcare settings and organized groups can often be efficiently contacted by letter or handout in collaboration with the respective administrators or leaders.

If symptoms are present or develop in these contacts, they need to understand that respiratory etiquette should be followed and medical care should be sought promptly; remember, providers must be made aware of the pertussis exposure in order to appropriately evaluate, treat, and limit risk to others in the office. During outbreaks and periods of increased community pertussis activity, local health care providers should be updated on the current situation, signs and symptoms of pertussis, diagnostic testing options, infection control for the office and prophylaxis/treatment recommendations by local health authorities.

5.5 Work, School and Childcare Restrictions

Hospitalized patients should be cared for with droplet precautions; in outpatient settings wear surgical masks and eye protections when evaluating proven or suspected pertussis patients.

Exclude all confirmed and presumptive cases from childcare, school and healthcare settings until 5 days after starting an appropriate course of antimicrobial treatment; communicate rationale and legal basis for exclusion to the patient and the administrator of these settings (OAR 333-019-0010). Exclusion from other settings may be appropriate and can be recommended but is not legally enforceable.

5.6 Antibiotics Used for Treatment and Prevention

The antibiotics and dosages used for treatment and post-exposure disease prevention (still archaically referred to as “chemoprophylaxis”) are the same (refer to the table below). Antibiotics given early in the catarrhal stage may attenuate the disease; when given during the paroxysmal stage communicability is reduced but there is little effect on the course or duration of illness. Azithromycin, clarithromycin and erythromycin eradicate *B. pertussis* from the nasopharynx; infectivity is probably minimal 5 days after starting treatment with any of these agents. In principle, chemoprophylaxis of asymptomatic contacts helps to interrupt transmission by eliminating the organism during the incubation period. Azithromycin and erythromycin are both pregnancy category B (minimal risk); clarithromycin and trimethoprim-sulfamethoxazole are category C and should be used in consultation with prenatal care provider.

- **Azithromycin.**

  Azithromycin (Zithromax®; total dose 30 mg/kg for kids or 1.5 g for adults) is equally effective and more convenient and tolerable than a 10-day course of erythromycin.

  The most frequently reported side effects are gastrointestinal; drug interactions are uncommon, but always inquire about other concurrent medications.

- **Clarithromycin**

  A 7-day course of clarithromycin (Biaxin®) is as effective as 10 days of erythromycin; again, greater convenience and tolerability come at a higher price. Although uncommon, the most frequently reported side effects are gastrointestinal; drug interactions occur so inquire about concurrent medications.

- **Erythromycin**

  Erythromycin (many generic brands), especially the estolate preparation, has long been the recommended drug for pertussis treatment and prophylaxis. Patient compliance with the cumbersome 4-times-daily, 14-day course is poor and gastrointestinal side effects are common. A lower dose, shorter duration regimen that is more tolerable and equally effective is now recommended (see table). Use of erythromycin in infants can be complicated by infantile hypertrophic pyloric stenosis; parents and providers should be made aware if clients in this age group receive erythromycin. Overall, serious side effects are rare with erythromycin *unless* the patient is taking other medications; be

sure to ask and consult with a pharmacist if there is any concern about interactions.

- **Trimethoprim-Sulfamethoxozole**

  TMP-SMX (Bactrim®, Septra®, generic) also appears to be effective in eradicating *B. pertussis* from the nasopharynx; it is recommended as an alternative antibiotic for patients who cannot tolerate any of the above marcrolides. This drug can cause nausea, vomiting, and rash.

TABLE. Recommended antimicrobial treatment and postexposure prophylaxis for pertussis

Drug	Children	Adults
Azithromycin	Minimum age: all ages* Age 0-5 months: 10 mg/kg p.o. x 5 days Age ≥6 mo: 10 mg/kg (maximum 500 mg/dose) on day 1, then 5 mg/kg on days 2–5 (maximum 250 mg/dose)	500 mg p.o. in a single dose day 1; then 250 mg p.o. as single daily dose on days 2–5
Clarithromycin	Minimum age: 1 months* 20 mg/kg/day p.o. in 2 divided doses x 7 days (maximum 1 g/day)	500 mg p.o. twice daily x 7 days
Erythromycin**	Minimum age: not recommended for neonates (<1 month old) 40–50 mg/kg/day p.o. in 3 divided doses x 7 days (maximum 1 g/day)	1 g per day in 3 divided doses x 7 days
Trimethoprim-Sulfamethoxozole (TMP-SMX)	Minimum age: 2 months 4 mg/kg (TMP component) p.o. twice daily x 14 days (maximum 320 mg/day TMP component)	One double strength tablet (160 mg TMP component) p.o. twice daily x 14 days

* Use for kids < 6 months old is not FDA approved.
** When prescribing erythromycin to infants < 3 months of age, providers should inform parents about possible risks for infantile hypertrophic pyloric stenosis (IHPS) and counsel them about signs of developing IHPS

6. MANAGING SPECIAL SITUATIONS 4

6.1 Case Works at or Attends a Daycare (Suspect, Presumptive, or Confirmed Case)

Notify parents of children in the same classroom(s) as soon as possible but within 72 hours. Quicker notification is appropriate in settings with infants. In

addition to providing background on pertussis, the notice should advise parents to:

- verify their child's immunizations and get remaining doses in the series if necessary;
- report any respiratory illness that occurs within 3 weeks of last contact with the case and seek medical care for diagnosis and appropriate treatment;
- if recommended (see §5.2.B), obtain chemoprophylaxis for their child;
- ask about possible cases among attendees or employees within the previous 4 weeks. In infant settings, all potential cases should be investigated and necessary measures taken to stop transmission.

Prevent further spread by verifying that these recommendations have been followed. As indicated, refer symptomatic students and staff to medical care for treatment and nasopharyngeal specimen collection.

Daycare operators should notify their LHD of any additional respiratory illness occurring during the period of surveillance. Admissions to the facility should be evaluated according to risk of pertussis complications.

Exclusion Policies

All confirmed and presumptive cases should be excluded from childcare or school until 5 days after starting appropriate antimicrobial treatment (OAR 333-019-0010). Confirmed and presumptive cases who do not take appropriate antimicrobial treatment should be excluded until 21 days after onset of cough.

Because pertussis is a restrictable, reportable disease, OAR 333-019-0010(3) requires that exposed, undervaccinated children be excluded from attendance at school and children's facilities (for 21 days after their last exposure) unless the local health officer determines that exclusion is not necessary to protect the public's health. However, these individuals (especially asymptomatic contacts who are at risk of severe illness) should be monitored for signs and symptoms of pertussis. At the health officer's discretion, these persons can be readmitted once vaccinated and advised to complete the series. Contacts who have not received the recommended number of pertussis-containing vaccinations (i.e., DTaP, Tdap) should be advised to follow the age-appropriate catch-up immunization schedule. Children who had laboratory confirmation of pertussis within the previous 3 years are probably immune and need not to be excluded.

6.2 Case is a Health Care Worker

The infection control practitioner (ICP) of the affected facility should identify and refer all symptomatic contacts (patients and coworkers) for medical evaluation and presumptive treatment immediately. In addition, chemoprophylaxis should be given to exposed healthcare personnel (HCP) who

- have not had Tdap; or
- are likely to expose a neonate or a pregnant woman (even if they have had Tdap).

In addition, unvaccinated HCP should be given Tdap, regardless of age, and all exposed HCP should be monitored daily for 21 days and treated promptly should symptoms of pertussis ensue.

The asymptomatic contacts may remain in the workplace if they comply with prophylaxis and lack respiratory symptoms; they should be under surveillance for 21 days past their last known exposure. Health care workers should contact the facility ICP if respiratory symptoms develop and not work until pertussis is excluded. If the facility has no ICP, consult with the staff of the Immunization Program for guidance.

6.3 Outbreak Situations

An outbreak is defined as two or more PCR- or culture-positive cases with common exposure (e.g., same school classroom) and illness onsets clustered in time consistent with known incubation periods for pertussis. Outbreaks are more likely in certain settings, e.g., schools with many unimmunized children or daycare centers with many infants who have not completed a primary DTaP series. Outbreaks also occur among older students whose immunity to pertussis has waned after immunization.

If there are cases of pertussis in a childcare or school setting, work with the administration to facilitate distribution of an appropriate letter to inform parents/guardians and staff about pertussis; local health care providers should also be alerted. Letters can be distributed to classes, grades, extracurricular groups, or to the entire childcare center or school, depending on the situation. School-wide or community-wide notification through a media alert is best done by consensus with school officials and local health department staff.

An investigation can be started without culture-confirmed cases but, during the investigation, laboratory confirmation by culture of at least one case is strongly recommended. Multiple pseudo-outbreaks have occurred in which “cases” were only tested by PCR and were later shown to be erroneous. Once cultures have proven the existence of an outbreak, lab testing of every symptomatic contact may not be necessary. Consider limiting testing of symptomatic persons in this situation to high-risk contacts. However, as subsequent generations of potential cases are identified, additional attempts for culture confirmation should be made to ensure that we are still dealing with pertussis so that large efforts aren’t expended needlessly. Classroom-wide prophylaxis is generally not

recommended. In some settings, the Immunization Program may recommend an accelerated DTaP schedule for infants to provide earlier immunity for this high-risk group.

REFERENCES

1. Misegades LK, et al. JAMA. 2012;308:2126–32.
2. Acosta AM, et al. Pediatrics. 2015 Jun;135:981–9.

UPDATE LOG

November 2018. Updated the adolescent Tdap recommendation for persons who received a dose of Tdap as part of the catch-up series.(Juventila Liko)

May 2018. Updated immunity and exclusion sections. (Juventila Liko)

February 2018. Edited OSPHL Specimen Collection instructions. Revised the approach on how to treat PCR+ cases who have not yet been coughing for 14 days. Clarified the risk of transmission through contaminated objects. (Sarah Humphrey and Juventila Liko)

August 2017. Added laboratory confirmation to the outbreak definition. (Paul Cieslak and Juventila Liko)

April 2017. Lab and exclusion sections revised for clarity and placed in new template. (Juventila Liko)

September 2015. Updated the immunity section and clarified treatment recommendations. (Juventila Liko and Paul Cieslak)

August 2015. Added information about how to deal with non-*pertussis Bordetella* species. (Juventila Liko and Paul Cieslak)

September 2014. Revised postexposure antimicrobial prophylaxis for high-risk contacts who have been exposed within 21 days. (Paul Cieslak and Paul Lewis)

April 2014. Clarified the language about culture confirmation in an outbreak setting. (Juventila Liko and Paul Cieslak)

December 2013. Oregon's case definition for pertussis has been revised to reflect changes to the national definition. (Juventila Liko)

January 2013. Added information about how to collect maternal vaccination information among infants reported with pertussis. Updated Tdap vaccination recommendations for pregnant women with every pregnancy. (Juventila Liko)

July 2012. Updated guidelines for other species of *Bordetella*. (Juventila Liko)

November 2011. Added recommendations for use of Tdap in pregnant women. (Juventila Liko)

September 2011. Revised "immunization" and "case is a health care worker" sections to reflect current ACIP recommendations. LHD should call back to ascertain whether duration was ≥14 days, and investigate contacts (calling back symptomatic ones at ≥14 days) as necessary. Clarification added regarding data

entry of “close contacts” in Orpheus. The lab section was updated to reflect the most recent OSPHL guidelines. (Juventila Liko)

May 2010. More tweaking to case definitions. (Again?!?) (Juventila Liko, Bill Keene)

March 2010. Case definitions revised to be more in line with the national definition. (Paul Cieslak) September 2009. Flow charts deleted. (Juventila Liko)

October 2008. Given that immunity isn’t certain among infants, and that pertussis can probably circulate in the family for some time, the guideline was revised to recommend prophylaxis for family members, even if there’s only one infant in the household and he’s the case. (Juventila Liko)

November 2007. Editing of some language and fixed formatting issues. (Juventila Liko, Bill Keene)

September 2007. Outbreak management now emphasizes the importance of culture confirmation of at least some cases to avoid pseudo-outbreaks. A suggestion of 3–6 weeks after symptom onset for lab testing is recommended. (Paul Lewis, Juventila Liko)