

# Pertussis

## 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 shall be 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 Authority 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<sup>3</sup>) 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.

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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 believed to wane after 4-20 years. Efficacy of the “whole-cell” vaccine was 70-90%, but after 5-10 years protection waned. The acellular vaccine series (recommended in the US for the entire series since 1997) has an efficacy of approximately 80-90% in young children but immunity also appears to wane over time. 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% (Misegades LK, et al. JAMA. 2012;308:2126-32). 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% (Acosta AM, et al. Pediatrics. 2015 Jun;135(6):981–9).

## 3. DEFINITIONS 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 child care, 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 OPHD)

- Culture-positive and an acute cough illness of any duration

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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)

- 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)

- Persons with a compatible illness but neither lab confirmed nor close contact of a confirmed case. A compatible illness is defined as cough lasting  $\geq 14$  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

Both culture and PCR are available at the OSPHL. In general, culture is less sensitive but more specific than PCR. Sensitivity declines rapidly after onset, but testing can be worthwhile within 3 weeks of onset of coughing in those over 1 year of age and up to 6 weeks after onset in infants. In some instances, it may not be feasible to get perfect specimens. Contact the OSPHL (503.693.4100) to discuss such issues or any specimen collection and transport questions.

#### Culture

The OSPHL will confirm pure isolates submitted from other laboratories and will culture specimens to isolate and identify *B. pertussis* from nasal washes or swabs of the posterior nasopharynx. Unfortunately, throat and anterior nares swabs are almost worthless—to the point where we won’t even consider running them. You’ll have to go deep for it to be worthwhile. Because *B. pertussis* is fastidious and its growth in culture is easily obscured by other organisms, proper specimen collection and handling is imperative. Follow these instructions carefully.

Obtain a specimen ASAP during the first 3 weeks of illness and prior to administration of antibiotics. Nasal washes should be transported in a sterile tube or similar container. NP swabs should be placed aseptically into Regan-Lowe transport medium. If Regan-Lowe transport is not available, contact the OSPHL for further instructions. Refrigerate the transport media or nasal wash immediately after collection and promptly forward it to the OSPHL. If shipped by courier, place in a biohazard bag with absorbent material. Include a General Microbiology requisition form. If mailed, the transport media must be properly packaged in double containers with absorbent material around them and should be shipped with the completed General

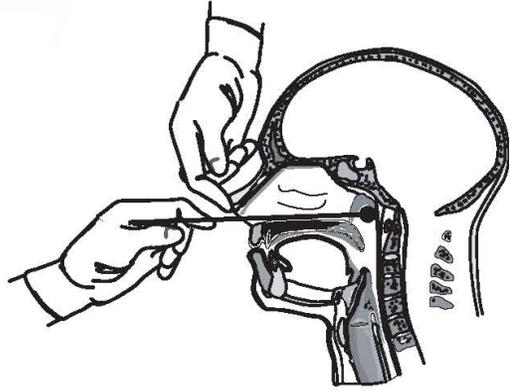
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Microbiology form. Use an insulated shipping container and enough cold packs (not dry ice) to keep it cold until it arrives. Shipping immediately after collection yields the best recovery rates. The down side is the added trouble and expense of shipping refrigerated specimens. Appropriate collection kits, forms, and mailing containers are available from the OSPHL (503.693.4100). Detailed instructions are available at <http://public.health.oregon.gov/LaboratoryServices/Documents/pertuss.pdf>

### Polymerase Chain Reaction (PCR)

The OSPHL offers “real-time” PCR testing for *B. pertussis* as well as *B. parapertussis* and *B. holmseii*. This test is available free of charge to those submitting specimens through local health departments in Oregon and clinicians participating in the MAPS pertussis study. Tests on specimens from non-public health submitters will be performed on a fee for service basis. RT-PCR is more sensitive than culture and results are available faster. The pertussis kits available from the OSPHL include the appropriate swabs and transport tubes for PCR testing as well as for pertussis culture. PCR testing for pertussis is also commercially available and is widely used by Oregon physicians.

Swabs to be transported to the OSPHL should be, refrigerated immediately after collection and transported with cold packs.



### 3.7 Specimen Collection

Pertussis kits from the OSPHL contain Dacron® polyester tipped swabs on flexible wire shafts. Do not substitute calcium alginate swabs—these are contraindicated for PCR. Try to get two swabs, one through each nostril. If you get only one, use the Regan-Lowe transport media and submit for culture only. OSPHL will attempt to do PCR on the swab after the culture is set up.

To collect the specimen:

- Bend wire so that it mimics the curve of the nasal airway.
- Gently pass swab through the nostril to the posterior nasopharynx. Do not force the swab. A slight resistance will be felt when the posterior nasopharynx is reached.
- Rotate the swab and leave in place for 30 seconds or until the patient coughs. Repeat procedure through the second nostril.
- Submit both swabs.

### 3.8 Other Laboratory Methods (Not Available at OSPHL)

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. Use discretion about the need for further investigation if a convincing serologic test is found among a well defined group with suspected on-going transmission.

Direct Fluorescent Antibody. DFA was used for *B. pertussis* screening in the past, but lacks sensitivity and specificity. We pretty much consider DFA results useless for pertussis.

### 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 confirmed and presumptive cases should be investigated. Cases with positive labs for pertussis and symptomatic contacts of the confirmed cases should be called back if they have been coughing less than 14 days. In addition, any lab confirmed suspect also should be investigated. Symptomatic contacts of presumptive cases may be investigated at the discretion of the local health authority.

### 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 less than 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.

### 4.2 Follow-up 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 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 under age 1 year 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.

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### 5.5 Work, School and Child-Care Restrictions

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

Exclude all confirmed and presumptive cases from child care, school, and health care 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 as effective as a 10-day course of erythromycin, but the greater convenience and tolerability is accompanied by a high price (typically >\$50 for an adult course). 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

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-Sulfamethoxazole (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
<p>* Use for kids &lt; 6 months old is not FDA approved.</p> <p>** When prescribing erythromycin to infants &lt; 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.</p>		

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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-Sulfamethoxazole

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

## 6. MANAGING SPECIAL SITUATIONS

### 6.1 Case Works at or Attends School or Day Care (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.

Day care 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.

In settings where infants may have been exposed, consider excluding asymptomatic contacts who elect not to take antibiotics or who are not up-to-date with pertussis immunization (especially children who have not had 3 doses of a pertussis-containing vaccine) for 21 days after their last exposure.

### 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

Pertussis outbreaks are defined as two or more cases from different households clustered in time (e.g., cases that occur within 42 days of each other) and space (e.g., in one child care center or classroom). Outbreaks are more likely in certain settings, e.g., schools with many unimmunized children or day care centers with

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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.

### 7. UPDATE LOG

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  $\geq 14$  days; and investigate contacts (calling back symptomatic ones at  $\geq 14$  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)