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Pertussis

Current Situation

Nationwide we have seen an increase in pertussis cases in 2012 as compared to previous years. As of May 26, 2012, the Morbidity and Mortality Weekly Report (MMWR) indicates there has been a 1.7-fold increase in pertussis reports in the U.S. compared to the same time last year, 10,894 cases vs. 6,385 cases respectively.[1] Washington State has recently declared a statewide epidemic of pertussis, having seen 1,742 cases, 13.6 times the amount seen during this time period in 2011. Wisconsin has tallied 1,786 cases, an 11.7 fold increase, and New York State has reported over 1,000 cases of pertussis this year.

To date, the Southern Nevada Health District has reported 19 cases of pertussis to the Nevada State Health Division. This represents a 1.7-fold increase in cases when compared to last year at this time. Five (26.3%) of these cases were in children under the age of one, the age group at greatest risk for serious disease.

The number of cases reported to local health departments is only a fraction of the number of persons affected. Pertussis often goes undiagnosed, especially in older patients, who can then transmit illness to others. Providers are encouraged to include pertussis in their differential diagnosis of respiratory illness.

Symptoms and Transmission

Pertussis is a highly-communicable respiratory disease caused by *Bordetella pertussis* that is classically manifested by paroxysmal spasms of severe coughing, whooping, and posttussive vomiting.[2] Major complications are most common among infants and young children and include hypoxia, apnea, pneumonia, seizures, encephalopathy, and malnutrition. Adults and adolescents have a more variable presentation, ranging from asymptomatic to classic pertussis.

The incubation period for pertussis is 7 to 10 days, with a range of 5 to 21 days.[3] The catarrhal stage is characterized by coryza, sneezing, low-grade fever and a mild cough, and appears similar to the common cold. After about a week, the cough becomes more severe and the patient enters the paroxysmal stage of the disease. This stage is characterized by paroxysms of coughing, followed by a long inspiratory effort accompanied by a characteristic high-pitched whoop and/or posttussive vomiting. The inspiratory whoop is generally not present in adults or in children who contract mild cases of illness, despite immunization. Pertussis is a toxin-mediated disease and the symptoms may persist for as long as 10 weeks even with treatment. Patients are most infective during the catarrhal stage and the first 2 weeks of their illness, although the organism can be isolated up to 3 weeks after the onset of paroxysmal coughing. Transmission occurs through contact with respiratory droplets.

Laboratory Testing

Pertussis testing should be considered in anybody with a severe or persistent cough. It is appropriate to order testing up to 3 weeks after the onset of paroxysmal coughing. There are several tests that can be used for the diagnosis of pertussis (Table 1). Culture is considered the gold standard and is the most specific of the available tests. However, culture may take as long as two weeks, limiting the usefulness of the results in a clinical setting. PCR testing is more sensitive than culture, and can give results much sooner. The Centers for Disease Control and Prevention (CDC) recommends that PCR testing be performed **in addition to, not instead of,** culture. DFA testing, although widely available, has very poor specificity and should not be used for laboratory confirmation of disease.

Specimens should be collected from the posterior nasopharynx using a flexible nasopharyngeal swab (see Figure 1). For Polymerase Chain Reaction (PCR) testing, do not use calcium alginate swabs as they may contain substances that inhibit PCR. To avoid contamination of clinical specimens with pertussis containing vaccines, change gloves between vaccine administration and clinical specimen collection and process clinical specimens in an area separate from pertussis containing vaccine storage and administration. Contact the reference laboratory to identify the appropriate swab and transport media to be used for the test ordered. Table 1 contains swab and transport media types by local reference lab. Additional information on sample collection and best practices for healthcare professionals on the use of PCR for diagnosing pertussis is available on the CDC's website at: http://www.cdc.gov/pertussis/clinical/diagnostic-testing/index.html.

Figure 1. Specimen Collection from the Posterior Nasopharynx

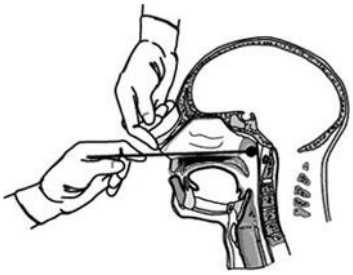

Image: Manual for the Surveillance of Vaccine-Preventable Diseases, 4th ed, 2008
http://www.cdc.gov/pertussis/clinical/diagnostic-testing/specimen-collection.html

Table 1. Pertussis Laboratory Testing*

Laboratory Name	Test Code
LabCorp	
B. pertussis and *B. parapertussis*, real-time DNA PCR	138677
B. pertussis culture	180224
Quest	
B. pertussis and *B. parapertussis*, DNA, Qualitative, real-time PCR	11365
B. pertussis culture	151555
Clinical Pathology Laboratories (CPL)	
B. pertussis/*B. parapertussis* by PCR	6096
Nevada State Public Health Laboratory	
B. pertussis and *B. parapertussis* real time PCR	No Code

*Contact reference laboratory for their specimen collection and transport media requirements

Treatment

Antimicrobial treatment for pertussis is most effective in minimizing the duration and severity of illness if administered during the prodromal period prior to the onset of paroxysmal cough. Table 3 contains the treatment and post-exposure prophylaxis recommendations by the AAP and CDC.[4] A patient is no longer considered to be infectious after having taken the appropriate antibiotic for 5 days. Exclude patients with suspect, probable or confirmed pertussis from childcare, school and other group activities until 5 days of effective antibiotic treatment (Table 3). If you have questions about exclusions, please contact the SNHD Office of Epidemiology.

Postexposure prophylaxis

Antimicrobial postexposure prophylaxis (PEP) is effective in preventing illness in persons exposed to pertussis (Table 3). PEP should be administered to close contacts who are at high risk for severe pertussis or who could transmit the disease to persons at high risk for severe pertussis. Because infants <1 year of age are considered to be at highest risk for severe illness they are high priority for receiving PEP. Pregnant women (particularly in their 3rd trimesters) are also high priority for receiving PEP because contracting pertussis and being contagious at the time of delivery puts their newborns in danger. Finally, anybody who could expose infants or pregnant women to pertussis is also considered high priority for PEP.[5,6] Initiation of PEP >3weeks after exposure is probably of no benefit.

Prevention

Although most children have been vaccinated, immunity wanes with age and some who are fully vaccinated can become infected. Adults and vaccinated children with pertussis can present with milder symptoms and hence have become a major reservoir for pertussis. Table 2 contains detailed up-to-date American Council of Immunization Practices (ACIP) pertussis vaccine recommendations. In summary,

- Children need five does of DTaP by kindergarten and an adolescent booster.[2]
- Adults 19 through 64 years of age should receive a single dose of Tdap to replace a single dose of Td for booster immunization against tetanus, diphtheria and pertussis. Provisionally, ACIP has recommended extending the Tdap recommendation to persons of all ages; the recommendation is currently under review by CDC.[6]
- Pregnant females should receive a single Tdap dose immediately after delivery, if not vaccinated prior to or during pregnancy. If administered during pregnancy the AAP, ACIP, and American College of Obstetricians and Gynecologists recommend administration occur after 20 weeks gestation to minimize the coincidental association with adverse outcomes, which occur most often during the first trimester.[7]
- Adults of all ages in contact with infants under age of one should receive a single dose of Tdap.[5]

Reporting

Per Nevada Administrative Code 441A, all known or suspected cases of pertussis should be reported to the Southern Nevada Health District Office of Epidemiology at (701) 759-1300, option #2. This number is available 24 hours a day, seven days a week. Please contact the Office of Epidemiology if you would like additional information or have questions about pertussis.

Table 2. Pertussis vaccine recommendations by age**

Birth to 6 years	• DTaP routinely recommended at 2, 4, and 6 months, at 15 through 18 months, and at 4 through 6 years.
7-10 years	• Tdap for those not fully vaccinated (complete series of DTaP = total of 5 doses) • Vaccinate according to the ACIP catch-up schedule, with Tdap preferred as the first dose.
11-18 years	• Tdap routinely recommended as a single dose with preferred administration at 11-12 years of age. • If not fully vaccinated as a child, refer to the ACIP catch-p schedule to determine what vaccines are indicated. • If no Tdap at 11 to 12 years of age, Tdap recommended at the next patient encounter, or sooner if close contact with infants
19-64 years	• Tdap is recommended to replace the next 10-year Td booster for any adult who has not received a previous Tdap dose. • Tdap can be administered regardless of interval since the previous Td dose, especially if adult has close contact with infants.
≥65 years	• Tdap recommended for those who have not previously received a dose and who have close contact with children under age 12 months. • Others not in contact with an infant who have not previously received a dose of Tdap may receive a single dose of Tdap in place of Td
Pregnant women and close contacts of infants	• Tdap recommended in the immediate postpartum period before discharge if not vaccinated prior to or during pregnancy. • DTaP or Tdap (depending on age) recommended for all family members and caregivers if not up-to-date, at least two weeks before coming into close contact with the infant.
Healthcare personnel	• Tdap recommended for those who have not previously received a dose and who have direct patient contact. • This is essential for those who have direct contact with babies younger than 12 months of age.

**Information in Table 2 is based on 2012 ACIP recommendations

References

1. Centers for Disease Control and Prevention. Provisional cases of selected notifiable diseases, United States, week ending May 26, 2012 (WEEK 21), Morbidity and Mortality Weekly Report, 61(21). Table II. http://wonder.cdc.gov/mmwr/mmwr_reps.asp?mmwr_year=2012&mmwr_week=21&mmwr_table=2G
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5. Advisory Committee on Immunization Practices (ACIP). Updated Recommendations for Use of Tetanus Toxoid, Reduced Diphtheria Toxoid and Acellular Pertussis Vaccine (Tdap) in Pregnant Women and Persons Who Have or Anticipate Having Close Contact with an Infant Aged <12 Months MMWR. 60(41): 1424-1426. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6041a4.htm?s_cid=mm6041a4_w
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9. Washington State Department of Health. Key messages about pertussis for healthcare providers in Washington State – Updated 5/10/12. http://www.doh.wa.gov/Portals/1/Documents/Pubs/Pertussis-HCP-Letter.pdf

Table 3. Recommended Antimicrobial Treatment and Postexposure Prophylaxis for Pertussis by Age Group. (Adapted from The 2009 Red Book Online published by the American Academy of Pediatrics and the CDC Recommendations set forth in Recommended Antimicrobial Agents for the Treatment and Postexposure Prophylaxis of Pertussis .Adapted from MMWR 54(RR14). 1-16.)

Primary Agents				Alternate Agent*
Age group	**Azithromycin**	**Erythromycin**	**Clarithromycin**	**TMP-SMZ**
<1 month	Recommended agent: 10 mg/kg per day in a single dose for 5 days (only limited safety data available)	Not preferred: Erythromycin is associated with infantile hypertrophic pyloric stenosis. Use if azithromycin is unavailable; 40–50 mg/kg per day in 4 divided doses for 14 days	Not recommended (safety data unavailable)	Contraindicated for infants aged <2 months (risk for kernicterus)
1-5 months	10 mg/kg per day in a single dose for 5 days	40-50 mg/kg per day in 4 divided doses for 14 days (max of 2grams per day)	7.5 mg/kg per dose, 2 times per day for 7 days	Contraindicated at age <2 months. For infants aged ≥2 months, TMP 8 mg/kg per day, SMZ 40 mg/kg per day, in 2 divided doses for 14 days
Infants (aged >6 months) and children	10 mg/kg in a single dose on day 1 then 5 mg/kg per day (maximum 500 mg) on days 2–5	40-50 mg/kg per day (maximum 2 g per day) in 4 divided doses for 14 days	15 mg/kg per day in 2 divided doses (maximum 1 g per day) for 7 days	TMP 8 mg/kg per day, SMZ 40 mg/kg per day, in 2 divided doses for 14 days
Adults	500 mg in a single dose On day 1 then 250 mg per day on days 2–5	500 mg (base formulation) per dose every 6 hours for 14 days	500 mg per dose 2 times per day for 7 days	TMP 320 mg per day, SMZ 1,600 mg per day, in 2 divided doses for 14 days
Preparation	Oral suspension: 100mg/5ml (15ml) 200mg/5ml (15ml, 22.5ml, 30ml) Tablet: 250 mg 500 mg 600 mg	Oral suspension and tablets: Oral Suspension: 200mg/5ml (100ml) 400mg/5ml (100ml) Tablet: 250mg 500mg	Oral suspension: 125 mg/5 mL (50ml, 100ml) 250 mg/5ml (50ml, 100ml) Tablets: 250 mg 500 mg 500mg XL	Oral suspension: TMP 8 mg/mL and SMZ 40mg/mL Tablets: Single Strength: TMP 80 mg and SMZ 400 mg Double Strength: TMP 160 mg and SMZ 800 mg

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