Chicago Department of Public Health

Health Update

City of Chicago
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Immunization Program

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Pertussis Testing and Treatment Guidelines

Date: August 1, 2012

To: Infection Control Professionals, Infectious Disease Physicians, Emergency Departments, Laboratories, and Health Care Providers

From: Julie Morita MD, Enrique Ramirez

Subject: **Clinical Guidelines for Testing and Treatment of Persons with Pertussis**

Background

During the first half of 2012, increased pertussis activity or outbreaks have been reported in a majority of states. Provisional counts from CDC's surveillance system indicate that more than 17,000 cases of pertussis were reported through July 12, 2012. Nine pertussis-related deaths have been reported during that same time period. The majority of deaths continue to occur among infants younger than 3 months of age. The incidence rate of pertussis among infants is the highest, followed by the rateamong children 7 through 10 years old, and the rate among adolescents 13 and 14 years of age.In Chicago (as of July 30, 2012), 146 cases have been reported with an incidence of 5.4 cases/100,000 persons which is slightly higher than the national incidence (5.24/100,000 persons). The following are guidelines and recommendations for when to suspect pertussis in an individual and how to test and treat appropriately.

Pertussis is a Class I(b) reportable disease in Illinois and any suspected case should be reported to the Chicago Department of Public Health within 24hrs by calling 312-746-5911.

When should I suspect pertussis in a patient?

Physicians should include pertussis in their differential diagnosis for patients in all age groups who present with a *prolonged cough illness.***A history of immunization does not preclude the possibility of pertussis.**

Symptoms of pertussis: Pertussis starts with mild cold-like upper respiratory symptoms (catarrhal stage). In children, adolescents and adults, there is typically progression to cough (paroxysmal stage). Coughing paroxysms may be followed by an inspiratory whoop or post-tussive vomiting. Fever is absent or minimal and cough is nonproductive.

—Infants <6 months of age: The diagnosis of pertussis in young infants is often delayed because of deceivingly mild initial symptoms. Cold-like symptoms may be brief. Gagging, emesis, gasping, cyanosis, apnea, or seizures may be apparent rather than a cough or whoop. Leukocytosis (white blood cell count of >20,000 cells/mm3) with >50% lymphocytes is suggestive of pertussis and may increase over time. Mild illness may rapidly progress into respiratory distress.

—Children, adolescents and adults: Pertussis after infancy is common, but is often misdiagnosed. Studies have demonstrated that up to 20% of prolonged cough illnesses in adults are due to pertussis. Some older patients have typical pertussis symptoms, but others have non-specific cough illness that may be difficult to distinguish from bronchitis or asthma. Adolescents and adults may report a choking sensation and sweating episodes. Complications include syncope, sleep disturbance, incontinence, rib fractures and pneumonia. Patients typically appear well when not coughing and may have normal physical findings and complete blood counts.

The infectious period is defined as 1 week before cough onset to 21 days after cough onset if untreated or 5 days after initiation of appropriate antibiotic therapy. Infants aged <1 year with pertussis remain infectious for longer periods (up to 42 days from cough onset) if untreated.

What type of testing should I perform on a patient who I suspect may have pertussis?

Nasopharyngeal (NP) Swabs are the preferred specimen for pertussis testing and should be collected as soon as pertussis is suspected (preferably within 21 days of cough onset) for the best chance of detection of the bacteria. Visit the following link for a demonstration of how to collect a specimen: http://www.cdc.gov/pertussis/clinical/diagnostic-testing/specimen-collection.html

Tests that should be ordered:

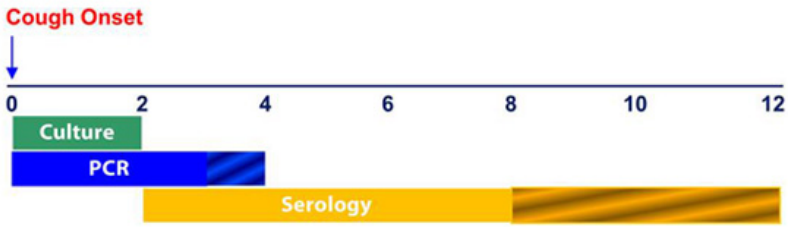
If possible, NP swabs should be collected for testing with both polymerase chain reaction (PCR) and culture. However, if only one specimen can be collected, it should be sent for PCR testing.

- Culture: Isolation of *B. pertussis* remains the gold standard for pertussis testing; however, the sensitivity of culture is low and the time needed to obtain results may be long (days to as long as 2 weeks). The efficacy of culture in detecting *B. pertussis* is greatest during the catarrhal phase and first 14 days following cough onset. Receipt of antibiotics effective against *B. pertussis* decreases the likelihood of isolating *B. pertussis* in culture. Accordingly, if more than 14 days have elapsed since cough onset or the patient has received antibiotics effective against *B. pertussis*, testing with culture is not recommended.

- PCR is a valuable tool for the detection of *B. pertussis* because the test is substantially more sensitive than culture and results are available more rapidly. PCR is most reliable during the catarrhal phase and within the first 21 days after onset of cough and before initiation of appropriate antibiotic treatment. However, a positive PCR test result is not dependent upon the presence of living organisms; thus, the impact of antibiotic treatment on the test result is less with PCR than with culture. Best practices for healthcare professionals on the use of polymerase chain reaction (PCR) for diagnosing pertussis can be found here: http://www.cdc.gov/pertussis/clinical/diagnostic-testing/diagnosis-pcr-bestpractices.html

- Serology: Commercially, there are many different serologic tests used in United States with unproven or unknown clinical accuracy. CDC is actively engaged in better understanding the usefulness of these commercially available assays. Generally, serologic tests are more useful for diagnosis in later phases of the disease. The optimal timing for specimen collection is 2 to 8 weeks following cough onset, when the antibody titers are at their highest; however, serology may be performed on specimens collected up to 12 weeks following cough onset.

Optimal Timing for Diagnostic Testing (weeks)



Sending specimens for testing:

- If the patient is suspected of having pertussis, the specimens should be sent to a commercial laboratory that performs pertussis PCR (and culture, if possible) testing.

- As of August 1, 2012, pertussis PCR testing performed at the IDPH Laboratory will be limited to those requests pre-approved by the Chicago Department of Public Health. All hospitals and healthcare providers must seek approval from CDPH (312-746-5911) before submitting a specimen to the IDPH Laboratory. Approval will be dependent upon several factors including severity of illness and probability of outbreak.

Table 1.Commercial labs performing Pertussis PCR (nasopharyngeal specimen)

Laboratory	Customer Service Number
ACL Labs	866-877-7016
ARUP Labs	800-522-2787
Evanston Hospital –N. Shore University Health System	547-570-2000
LabCorp	800-338-4333
Mayo Medical Laboratories	800-533-1710
Quest Diagnostics	866-697-8378

How should I clinically manage a patient that I suspect may have pertussis?

Exclude, isolate, and treat the case-patient according to how long the patient has been coughing:

Table 2. Management of patients suspected of having pertussis.

Case-Patient	Diagnostic Evaluation	Treatment	Exclusion
Coughing for ≤ 21 days	If possible, NP swabs should be collected for testing with both polymerase chain reaction (PCR) and culture	Appropriate antibiotic treatment is required regardless of immunization status(see page 5)	Isolate and exclude from public activities, school, and the workplace through the first 5 days of the full course of antibiotics, or through 21 days from the onset of cough for those who do not receive appropriate treatment.

Coughing for > 21 days	For confirmation purposes only, NP swabs should be collected for testing with both polymerase chain reaction (PCR) and culture. PCR test result is not dependent upon the presence of living organisms.	Antibiotic treatment is **not** recommended, because the case-patient is already beyond his/her infectious period and initiating treatment more than 21 days after onset of cough is unlikely to be beneficial. *	If the patient has been coughing for more than 21 days, exclusion and isolation is not necessary unless the patient is an infant. If the patient is an infant, he/she should be excluded until 42 days after cough onset or until 5 days after initiation of treatment with an appropriate antibiotic.
*** situations in which treatment is recommended >21 days after cough onset:** Treatment should be initiated within 42 days (6 weeks) of cough onset in infants aged <1 year and pregnant women (especially near term); Treatment should be initiated in any coughing individual who is culture positive, regardless of time since cough onset			

How should I treat household members of a patient I suspect may have pertussis?

Household members of a pertussis case-patient are considered close contacts and should be managed based on: (1) whether the household member has symptoms; (2) how long the household member has been coughing; and (3) the time since the household member was exposed to the case-patient (while the case-patient was infectious).

Table 3.Management of household members of a patient suspected of having pertussis

Household Member	Cough Duration	Diagnostic Evaluation	Treatment/Prophylaxis	Exclusion
Symptomatic **household member**	**Coughing for ≤ 21 days**	Refer for medical evaluation and diagnostic testing, as appropriate for age and cough duration	Begin on presumptive antibiotic treatment. Treatment is recommended regardless of immunization status (see page 5)	Exclude from public activities, school, and the workplace through the first 5 days of appropriate antibiotic treatment, or 21 days from the onset of cough for those who do not receive appropriate antibiotic treatment
	Coughing for >21 days	Refer for medical evaluation and diagnostic testing, as appropriate for age and cough duration	Antibiotic treatment is **not** recommended, as contacts are already beyond their infectious period, which ends 21 days after cough onset. Initiating treatment >21 days after onset of cough is unlikely to be beneficial*****	No exclusion is required, except in the following scenario: the patient is an infant aged <1 year and has been coughing for ≤42 days and has not taken antibiotics
Asymptomatic **household member**	**If last exposure occurred ≤21 days ago**	No medical evaluation is needed, unless household member develops symptoms	Recommend antibiotic prophylaxis regardless of immunization status. Note: prophylaxis is still recommended in household members that may be asymptomatic if the time they were exposed to the case-patient was ≤21 days	No exclusion is required, even if antibiotics are not taken, except for some contacts working in high risk settings, which include: Healthcare workers and individuals in a childcare setting where there is contact with infants <1 year of age

	If last exposure occurred >21 days ago	No medical evaluation is needed, unless household member develops symptoms	Antibiotic prophylaxis is not recommended, as initiating prophylaxis >21 days after exposure is unlikely to be beneficial. However, prophylaxis should be considered for infants aged <1 year (particularly those <6 months of age with <3 doses of DTaP)	No exclusion is required, even for infants aged <1 year
***situations in which treatment is recommended >21 days after cough onset:** Treatment should be initiated within 42 days (6 weeks) of cough onset in infants aged <1 year and pregnant women (especially near term); Treatment should be initiated in any coughing individual who is culture positive, regardless of time since cough onset				

Table 4. Recommended antimicrobial treatment and postexposure prophylaxis for pertussis, by age group.

Age group	Azithromycin	Erythromycin	Clarithromycin	Alternate agent* TMP-SMX
<1 month[a]	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	15 mg/kg per day in 2 divided doses for 7 days	Contraindicated at age <2 months. For infants aged ≥2 months, TMP 8 mg/kg per day, SMX 40 mg/kg per day in 2 divided doses for 14 days
Infants (aged ≥6 months) and children	10 mg/kg (maximum: 500 mg) in a single dose on day 1 then 5 mg/kg per day (maximum: 250 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, SMX 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	2 g per day in 4 divided doses for 14 days	1 g per day in 2 divided doses for 7 days	TMP 320 mg per day, SMX 1,600 mg per day in 2 divided doses for 14 days

**Trimethoprim sulfamethoxazole (TMP–SMX) 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. Because of the potential risk for kernicterus among infants, TMP-SMX should not be administered to pregnant women, nursing mothers or infants aged <2 months.*

[a]Infants <1 month of age who receive any macrolide should be monitored for the development of IHPS for one month after completing the course.