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## **Recommended Diagnostic Testing for Pertussis**

**Recommendations:** The Centers for Disease Control and Prevention (CDC) and the Wisconsin State Laboratory of Hygiene (WSLH) recommend that if a health care provider suspects that a patient has pertussis, diagnostic specimens should be collected. Only persons with a cough should be tested (see Algorithms I and II). Restricting testing to symptomatic persons reduces the possibility of false positive test results.

It is advised to test using both polymerase chain reaction (PCR) and culture, particularly in circumstances where the patient has contact with persons at high risk for developing severe disease or there are multiple persons with cough illness in the patient's home. Culture should also be used at the beginning of a suspected outbreak to guide appropriate control measures and subsequent laboratory testing. If specimens for both tests cannot be obtained at the same time, it is advised to test using PCR. Treatment should not be delayed because of the inability to test for pertussis.

The WSLH offers culture and PCR testing for *Bordetella pertussis*. Pertussis related testing is also conducted at commercial laboratories, although culture may not be as widely available as PCR.

To ensure that cases of pertussis are investigated in a timely manner, it is important that specimens be submitted to the testing laboratory immediately upon suspicion of pertussis. Please do not hold specimens for group submission. It is also important to expeditiously report cases to the local public health agency of jurisdiction immediately by phone. Pertussis is a Category 1 reportable disease in Wisconsin. All Category 1 reportable diseases shall be reported immediately by phone upon identification of a case or suspected case. Within 24 hours submit a case report online through the Wisconsin Electronic Disease Surveillance System (WEDSS) or by mail using an Acute and Communicable Disease Case Report (F44151).

Certain circumstances, such as the inability of the patient to pay, may warrant fee-exempt testing at WSLH. Please contact your local health department regarding specific situations.

Persons who have received appropriate treatment for pertussis should not be tested following completion of treatment.

If you have any questions about who should be tested for pertussis, contact the Immunization Program at 608-267-9959.

## Diagnostic Tests

**Culture:** Historically, culture has been the gold standard for pertussis testing because of its high specificity; 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 first 14 days following cough onset. Receipt of antibiotics effective against pertussis decreases the likelihood of isolating *B. pertussis* in culture.

**PCR:** Polymerase chain reaction (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 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.

### Other Tests for Pertussis:

- Because direct fluorescent antibody (DFA) testing of nasopharyngeal secretions has been shown in some studies to have low sensitivity and variable specificity, it is no longer recommended by CDC.
- Serologic testing for pertussis is available in some areas but is not standardized and should not be relied upon as a criterion for laboratory confirmation.

**Interpretation of Results:** Specimens from patients with *B. pertussis* infection can yield negative test results, particularly when specimens are collected late during the course of illness. Consequently, consideration of a diagnosis of pertussis involves review of the patient's clinical signs and symptoms, along with the test result(s). A negative test result alone should not be used to rule out pertussis, regardless of when the specimen was obtained. Tests of an inappropriately obtained nasopharyngeal swab specimen will likely be negative using either (PCR or culture) testing method.

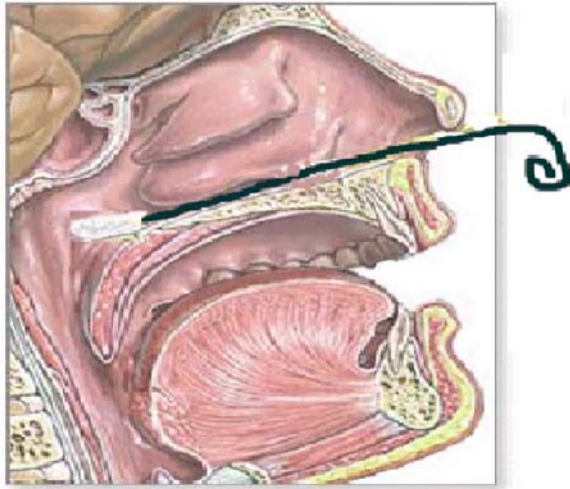
### Specimen Collection

When collecting specimens, gently insert the swab into one nare and proceed gently to the posterior wall of the pharynx (see diagram below). Do not direct the swab upward; let it creep along the floor of the nasal cavity. Also, slightly bending the wire swab into an arc shape may allow for easier insertion into the pharynx. Do not force the swab past obstruction; try the other nare if resistance is encountered. Hold the swab in place for up to 10 seconds, or until a paroxysmal cough is elicited (or ask the patient to cough). This should ensure an adequate specimen and reduce the possibility of false negative results. Repeat with a second swab. Some practitioners have found it easier to insert both swabs at the same time, which is acceptable. After removing the swabs from the nares, place one Dacron swab into the Regan-Lowe transport tube for culture testing and cap tightly. Place the other Dacron swab into the dry, sterile transport tube for PCR testing and cap tightly. Write the patient name and the date and time of collection on each tube.

Visit the following link for a demonstration of how to collect a specimen:

<http://video.cdc.gov/asxgen/nip/isd/swabdemo.wmv>

**Figure. A sterile swab is passed through the nostril and into the nasopharynx.**



### **Submission of Specimens for Testing at WSLH**

The WSLH offers both PCR and culture testing. Request kit #30 and the accompanying form "CDD Requisition Form (A)" from the WSLH by calling (800) 862-1088 or (608) 265-2966. If you have questions about the testing process or specimen collection, please contact the WSLH Customer Service at (800) 862-1013.

Tests offered include:

- Bordetella pertussis/parapertussis PCR      Test code 3223
- Bordetella Culture                                      Test code 623C

Kit #30 contains, among other things, 2 Dacron/polyester nasopharyngeal swabs, WSLH Regan-Lowe culture (charcoal transport) medium, and 1 sterile tube for transport of the PCR test portion. The swab applicators use a flexible wire, which is the only device that should be inserted into the nasopharynx for the collection of the specimen.

Wrap absorbent material around each tube. Place the transport tubes in the pressure bag provided and seal. If submitting a PCR specimen, you must also place a frozen cold-pack into the Styrofoam mailer. If specimens are not shipped immediately, they should be kept at room temperature or incubated at 35°C (95°F). Optimally, the WSLH would like to receive the specimen for culture within 24 hours of collection. The dry swab specimen for PCR is relatively stable and therefore time is less critical.

PCR testing is performed 2-3 days per week for *B. pertussis* and results are reported the day the test is performed. Negative culture results are reported within 7 days.

### **References:**

CDC. Manual for the surveillance of vaccine-preventable diseases. 4<sup>th</sup> edition, 2008. Pertussis: Chapter 10-1.  
<http://www.cdc.gov/vaccines/pubs/surv-manual/chpt10-pertussis.pdf>

CDC. Recommended antimicrobial agents for the treatment and postexposure prophylaxis of pertussis: 2005 CDC guidelines. MMWR 2005.  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5414a1.htm>

Sotir MJ, Cappozzo DL, Warshauer DM et al. Evaluation of polymerase chain reaction and culture for diagnosis of pertussis in the control of a county-wide outbreak focused among adolescents and adults. *Clinical Infectious Diseases* 2007;44:1216-1219.