



Communicable Disease Case Reporting and Investigation Protocol **DIPHTHERIA**

I. IDENTIFICATION AND DEFINITION OF CASES

A. Clinical Description: Diphtheria has two forms: respiratory and cutaneous. Respiratory (nasal, pharyngeal, tonsillar, and laryngeal) diphtheria is typically caused by toxin-producing strains of *Corynebacterium diphtheriae*. Cutaneous disease can be caused by either toxigenic or nontoxigenic strains. The respiratory form of the disease is characterized by the presence of a membrane that is usually visible over the tonsils or the throat. The incubation period for respiratory diphtheria is usually two to five days. Initial symptoms of illness include a sore throat and low-grade fever. Swelling of the neck (“bull-neck”) from soft-tissue inflammation can develop and is a sign of severe disease. The membrane may obstruct breathing and can be life threatening. The respiratory form of diphtheria usually lasts several days, and complications can persist for months. Untreated individuals can be infectious for two to six weeks. Individuals treated with an appropriate antimicrobial agent usually are not communicable 48 hours after treatment is initiated. Diphtheria is transmitted by respiratory tract droplets and by contact with discharges from skin lesions.

Nontoxigenic *C. diphtheria* can also cause membranous pharyngitis; the disease is usually mild but can lead to bloodstream invasion endocarditis. The isolation of *C. diphtheria* from the throat does not necessarily indicate a pathogenic role in the illness. Other pathogens can cause membranes in the respiratory tract, including *Streptococcus* species, Epstein-Barr virus, cytomegalovirus, *Candida*, and anaerobic organisms.

Cutaneous diphtheria, caused by either toxigenic or nontoxigenic strains, is usually mild, typically consisting of non-distinctive sores or shallow ulcers, and only rarely involving toxic complications. In the U.S., this type is most often associated with homeless persons or poor hygiene.

Clinical specimens should be obtained as soon as possible when diphtheria is suspected, even if treatment with antibiotics has already begun.

Diagnosis of diphtheria is usually made on the basis of clinical presentation since it is imperative to begin presumptive therapy quickly.

B. Laboratory Criteria: Laboratory confirmed infection is defined by:

- Isolation of *C. diphtheriae* from clinical specimen taken from the nose, throat, or any mucosal or cutaneous lesion by bacteriological culture, or
- Histopathologic diagnosis of diphtheria.

Polymerase chain reaction (PCR) testing done at the Centers for Disease Control and Prevention (CDC) is only recommended when diphtheria anti-toxin (DAT) has been requested to treat the patient.

C. Wisconsin Surveillance Case Definition:

- **Confirmed:** An upper respiratory tract illness with an adherent membrane of the nose, pharynx, tonsils, or larynx and any of the following:
 - Isolation of *C. diphtheriae* from the nose or throat, or
 - Histopathologic diagnosis of diphtheria, or
 - Epidemiologic linkage to a laboratory-confirmed case of diphtheria.
- **Probable:** In the absence of a more likely diagnosis, an upper respiratory tract illness with an adherent membrane of the nose, pharynx, tonsils, or larynx, and
 - Absence of laboratory confirmation (including a positive PCR without isolation of the organism).
 - Lack of epidemiologic linkage to a laboratory-confirmed case of diphtheria.

Note: Cutaneous diphtheria should not be reported. Respiratory disease caused by nontoxigenic *C. diphtheriae* should be reported as diphtheria. All diphtheria isolates, regardless of association with disease, are sent by the Wisconsin State Laboratory of Hygiene to the Diphtheria Laboratory, National Center for Immunization and Respiratory Diseases (NCIRD), CDC.

II. REPORTING

- A. **Wisconsin Notifiable Disease Category I – Methods for Reporting:** This disease shall be reported **IMMEDIATELY BY TELEPHONE** to the patient's local health officer or to the local health officer's designee upon identification of a case or suspected case, per Wis. Admin. Code § [DHS 145.04 \(3\) \(a\)](#). In addition to the immediate report, complete and fax, mail or electronically report an Acute and Communicable Disease Case Report (DHS [F-44151](#)) to the address on the form, or enter the data into the Wisconsin Electronic Disease Surveillance System, within 24 hours.
- B. **Responsibility for Reporting:** According to Wis. Admin. Code § [DHS 145.04\(1\)](#), persons licensed under Wis. Stat. ch. [441](#) or [448](#), laboratories, health care facilities, teachers, principals, or nurses serving a school or day care center, and any person who knows or suspects that a person has a communicable disease identified in [Appendix A](#).
- C. **Clinical Criteria for Reporting:** Clinically compatible illness. Cases should be reported immediately upon consideration of diphtheria in the differential diagnosis.
- D. **Laboratory Criteria for Reporting:** Laboratory evidence of infection. All positive results should be reported.

III. CASE INVESTIGATION

- A. **Responsibility for case investigation:** It is the responsibility of the local health department (LHD) to investigate or arrange for investigation of suspected or confirmed cases as soon as is reasonably possible. A case investigation may include information collected by phone, in person, in writing, or through review of medical records or communicable disease report forms, as necessary and appropriate.
- B. **Required Documentation:**
1. Complete the Wisconsin Electronic Disease Surveillance System (WEDSS) disease incident investigation report, including appropriate, disease-specific tabs.
 2. Upon completion of investigation, set WEDSS disease incident process status to "Sent to State."
- C. **Additional Investigation Responsibilities:**
1. Contact your Immunization Program regional representative: <https://www.dhs.wisconsin.gov/lh-depts/counties.htm>
 2. To assess the likelihood that a suspect case is a true case prior to laboratory testing, the LHD should ask about:
 - a. Clinical presentation, including date of onset of symptoms
 - b. Diphtheria immunization history
 - c. Country of origin and length of time in the U.S. (those in the U.S. for a short time are more likely to be susceptible)
 - d. History of recent travel (destination, dates, and mode of transportation—including stop-over information)
 - e. Whether there were any recent out-of-town visitors (from where and dates)
 - f. Whether there was any recent contact with anyone with similar symptoms
 - g. Risk factors for exposure and transmission (e.g., child care, school, health care settings)

IV. PUBLIC HEALTH INTERVENTIONS AND PREVENTION MEASURES

- A. In accordance with Wis. Admin. Code § [DHS 145.05](#), local public health agencies should follow the methods of control recommended in the current editions of *Control of Communicable Diseases Manual*, edited by David L. Heymann, published by the American Public Health Association, and the American Academy of Pediatrics' *Red Book: Report of the Committee on Infectious Diseases*, unless otherwise specified by the state epidemiologist.

- B. Implement control measures before laboratory confirmation. If the results are negative, the decision to continue control measures should be made in consultation with the treating health care provider, the LHD, and the Bureau of Communicable Diseases.
- C. Isolate case until two successive pairs of cultures obtained 24 hours or more apart and at least 24 hours after cessation of antimicrobial therapy are negative. If cultures cannot be obtained, isolation may end after 14 days of appropriate treatment. If a nontoxigenic strain is documented, isolation is not necessary.
- D. Identify close contacts, especially household members and other persons directly exposed to oral secretions of the patient.
- E. Clinical specimens should be sent to the Wisconsin State Laboratory of Hygiene.
- F. All suspected cases should be treated with diphtheria antitoxin (DAT) without waiting for culture confirmation. DAT is only available through the CDC. If diphtheria antitoxin is needed, please call the Wisconsin Immunization Program and we will make the arrangements to obtain and transport the antitoxin. Symptomatic close contacts should also be evaluated for initiation of therapy with DAT.
- G. All suspected cases and symptomatic close contacts should be treated with a 14-day course of penicillin or erythromycin in order to eradicate carriage of *C. diphtheria* regardless of the use of treatment with antitoxin. If the case or symptomatic close contact did not receive antimicrobial therapy, the cultures should be taken after symptoms resolve.
- H. Asymptomatic close contacts should be given antimicrobial prophylaxis with oral erythromycin for seven to 10 days or a single IM injection of penicillin.
- I. All contacts (both symptomatic and asymptomatic) whose occupations involve handling food must be excluded from that work until two successive pairs of cultures, obtained at least two weeks after completion of antimicrobial prophylaxis (if any) and are more than 24 hours apart are negative. Symptomatic contacts who are not food handlers shall be considered the same as a case until their culture results are negative. Asymptomatic contacts that are not food handlers must be on appropriate antibiotics and personal surveillance.
- J. Culture all close contacts regardless of immunization status, and keep under surveillance for seven days.
- K. Give a booster dose of a Td containing vaccine to previously immunized contacts and a primary series to unimmunized contacts. If the most recent dose was within five years, the booster dose is not necessary.
- L. Treat any confirmed carrier with an adequate course of antibiotic and repeat cultures at a minimum of two weeks to ensure eradication of the organism.
- M. Routine vaccination is the best preventive measure against diphtheria:
 - 1. All children less than 7 years of age should receive a routine series of five doses of diphtheria and tetanus toxoid-containing and acellular pertussis (DTaP) vaccines at ages 2, 4, 6, 15-18 months, and 4-6 years. Fully vaccinated is defined as five doses of DTaP or four doses if the fourth dose was administered on or after the fourth birthday.
 - 2. Individuals age 7 years and older should routinely receive a diphtheria toxoid booster as Td (tetanus toxoid, diphtheria toxoid) every 10 years. A one-time dose of Tdap vaccine (tetanus toxoid, diphtheria toxoid, acellular pertussis vaccine) should be substituted for Td if the individual has not previously received a dose of Tdap and is one of the following: (1) less than age 10 years and is not fully vaccinated* for pertussis, (2) age 11-64 years, or (3) age 65 years or older and especially those anticipating having close contact with an infant aged less than 12 months.

3. Unvaccinated persons 7 years and older (including persons that cannot document prior vaccination) should receive a series of three Td doses, with the first two doses separated by at least four weeks and the third dose given six to 12 months after the second. For added protection against pertussis, Tdap can be substituted for any of the three doses.

V. CONTACTS FOR CONSULTATION

- A. Local health departments and tribal health agencies: <https://www.dhs.wisconsin.gov/lh-depts/index.htm>
- B. Regional Immunization Program representatives: <https://www.dhs.wisconsin.gov/lh-depts/counties.htm>
- C. Bureau of Communicable Diseases, Immunization Program: 608-267-9959. After hours number 608-258-0099
- D. Wisconsin State Laboratory of Hygiene: 1-800-862-1013. After hours emergency number 608-263-3280

VI. RELATED REFERENCES

- A. Heymann DL, ed. Diphtheria. In: *Control of Communicable Diseases Manual*. 20th ed. Washington, DC: American Public Health Association, 2015: 150-155.
- B. Pickering LK, ed. Diphtheria. In: *Red Book: 2015 Report of the Committee on Infectious Diseases*. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2015: 325-329
- C. Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.
- D. Centers for Disease Control and Prevention. *Manual for the Surveillance of Vaccine-Preventable Diseases*. Diphtheria. Retrieved July 24, 2017 from <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt01-dip.html>
- E. Centers for Disease Control and Prevention. Measles Surveillance Worksheet. Retrieved July 24, 2017, from <https://www.cdc.gov/diphtheria/downloads/dip-wksht.pdf>
- F. Wisconsin Immunization Program Diphtheria webpage: <https://www.dhs.wisconsin.gov/immunization/diphtheria.htm>