

Diphtheria Investigation Overview

The following guidelines provide a brief overview of the steps of a diphtheria investigation. Diphtheria is a rare disease in the United States. Infection with toxin-producing strains of a Gram-positive bacterium, *Corynebacterium diphtheriae*, causes the disease. Sites of infection are primarily the respiratory mucosa (respiratory diphtheria) and the skin (cutaneous diphtheria). Rarely, extra-respiratory mucosal sites (e.g., eye, ear, genitals) may be affected. Non-toxin-producing strains of *C. diphtheriae* can also cause the disease, usually less severe. Humans are the only known reservoir of *C. diphtheriae*. The disease is transmitted from person to person by respiratory droplets or direct contact with respiratory secretions, discharges from skin lesions or, rarely, fomites. The onset of respiratory diphtheria is insidious and begins after an incubation period of 2–5 days (range 1–10 days). Before treatment was available, the case-fatality rate was approximately 50%; with treatment and vaccination more widely available, the case-fatality rate has declined significantly and remains approximately 10%. *C. ulcerans* is a zoonotic pathogen that occasionally causes diphtheria-like symptoms in humans. Always consult with the NC DPH Communicable Disease Branch (919-733-3419).

Basic Steps of a Diphtheria Investigation

1. Collect clinical and laboratory information
 - Immunization status (disease does not always confer immunity)
 - Clinical description
 - a. Onset date of sore throat, malaise, fever, lymphadenopathy, swelling, presence of pseudomembrane
 - b. Number and location of skin lesions if cutaneous diphtheria is suspected
 - c. Other symptoms: airway obstruction, myocarditis, neuritis, nephritis
 - Lab specimens collected from nose, throat or any cutaneous lesion per NC SLPH guidance <https://www.dph.ncdhhs.gov/state-lab/scope-guide-laboratory-services/open> and CDC reference guidance
 - Recommended testing also includes Gram stain and culture for thrush and other bacterial infections.
 - Epidemiologic linkages to similarly ill individuals, history of travel, or contact with companion animals
2. Determine infectious period
 - **Infectious:** until virulent bacilli have disappeared from discharges and lesions (usually 2 weeks or less)
 - **Non-infectious:** evidenced by 2 negative cultures 24 hours apart from both nose and throat (or from lesions, if cutaneous) collected 24 hours after treatment completion
 - Chronic carriers, although rare, can shed for 6 months or more.
3. Manage the case
 - Recommended treatment includes appropriate antimicrobial therapy. Refer to AAP Red Book.
 - If toxigenic *C. diphtheriae* is suspected, diphtheria antitoxin (DAT) should be obtained from CDC (770-488-7100) as the patient's condition may rapidly deteriorate. Consult with CD Branch (919-733-3419).
 - Immunization should be undertaken during convalescence.
 - If hospitalized, vaccinated staff caring for the patient should use Standard and
 - Droplet precautions for pharyngeal diphtheria for 14 days of appropriate antibiotic therapy
 - Contact precautions for cutaneous diphtheria for 14 days of appropriate antibiotic therapy
4. Identify all contacts exposed to the case during infectious period
 - Exposure is defined as habitual close contact with an infectious person, e.g.:
 - a. Household members
 - b. Individuals having direct contact with patient's respiratory, oral or nasal secretions
 - c. Healthcare personnel exposed to the patient's secretions
 - d. Individuals sharing utensils, kitchen facilities with the patient
 - e. Individuals caring for infected children
 - Consider using a line list to organize information about contacts
5. Gather information about contacts
 - Collect necessary information from contacts, including:
 - Date of last exposure to case while infectious
 - Immunization history
6. Manage contacts
 - Guidance depends on the likelihood of case being toxigenic or non-toxigenic. Call CB Branch (919 733-3419).
- *Contacts to non-toxigenic C. diphtheriae*
 - **Household contacts:**
 - Self-monitor for respiratory symptoms for 7 days from last exposure.
 - Individuals not up-to-date on vaccination should be referred for age-appropriate vaccination (Tdap, Td or DTaP), especially children.
 - Post-exposure prophylaxis (PEP) is not necessary unless strain is toxigenic.
 - **Healthcare personnel:**
 - Exposed staff should self-monitor for respiratory symptoms for 7 days from exposure.
 - Staff who are not up to date should be vaccinated.
 - PEP is not necessary unless individuals had unprotected exposure or the strain is toxigenic.
 - Medical facility can choose to provide PEP if desired. If giving PEP, obtain throat swab and nasal swab first for culture for *C. diphtheriae*.
- *Contacts to toxigenic C. diphtheriae*
 - Monitor for possible respiratory or cutaneous diphtheria for 7-10 days from time of last exposure to patient.
 - Obtain nasal and throat cultures for *C. diphtheriae*.
 - Administer prophylactic antibiotics (7 or 10 day course of penicillin or erythromycin, respectively), assessing diphtheria vaccination status, and administering any necessary vaccinations.
 - Patients and close contacts should receive a dose of diphtheria toxoid-containing vaccine, if not up to date.

References-

<https://www.cdc.gov/diphtheria/hcp/clinical-guidance/index.html>
<https://www.cdc.gov/diphtheria/media/pdfs/dip-key-questions-508.pdf>

Updated April 2026