



Diphtheria

INFECTION CONTROL IN HEALTHCARE PERSONNEL: EPIDEMIOLOGY AND CONTROL OF
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Infection Control in Healthcare Personnel: Epidemiology and Control of Selected Infections Transmitted Among Healthcare Personnel and Patients (2024)

AT A GLANCE

Diphtheria from the Infection Control in Healthcare Personnel: Epidemiology and Control of Selected Infections Transmitted Among Healthcare Personnel and Patients (2024) guideline.

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Recommendations

1. For healthcare personnel who have an exposure to diphtheria, regardless of vaccination status:
 - Administer postexposure prophylaxis in accordance with CDC recommendations.
 - Exclude from work and obtain nasal and pharyngeal swabs for diphtheria culture.
 - If nasal AND pharyngeal cultures are negative for toxin-producing *C. diphtheriae*, healthcare personnel may return to work while completing postexposure antibiotic therapy.
 - If nasal OR pharyngeal cultures are positive for toxin-producing *C. diphtheriae*:
 - Complete postexposure antibiotic therapy.
 - Healthcare personnel may return to work when:
 - Postexposure antibiotic therapy is completed AND
 - At least 24 hours after completion of postexposure antibiotic therapy, two consecutive pairs of nasal AND pharyngeal cultures, obtained at least 24 hours apart, are negative for toxin-producing *C. diphtheriae*.
 - Implement daily monitoring for the development of signs and symptoms of diphtheria for 7 days after the last exposure.
2. For healthcare personnel with respiratory diphtheria infection, exclude from work until:

- Antibiotic and antitoxin (if needed) therapy are completed AND
- At least 24 hours after completion of antibiotic therapy, two consecutive pairs of nasal AND pharyngeal cultures, obtained at least 24 hours apart, are negative for toxin-producing *C. diphtheriae*.

3. For healthcare personnel with cutaneous diphtheria infection or other diphtheria infection manifestations, determine the duration of exclusion from work in consultation with federal, state, and local public health authorities.

Background

Healthcare-associated transmission of diphtheria has been reported, although diphtheria is uncommon in the United States [\[1\]](#) [\[2\]](#) [\[3\]](#) [\[4\]](#) [\[5\]](#). Diphtheria remains endemic in many parts of the developing world, and ongoing circulation of toxigenic *Corynebacterium diphtheriae* (*C. diphtheriae*) strains has been reported in North America [\[2\]](#) [\[6\]](#) [\[7\]](#). Healthcare personnel (HCP) are not at substantially higher risk than the general adult population for acquiring diphtheria; however, there is the potential for sporadic or imported cases to require medical care in the United States. Some cases in the United States have been related to importation [\[2\]](#) [\[6\]](#) [\[8\]](#) [\[9\]](#).

Prevention of transmission of *C. diphtheriae* in healthcare settings involves:

1. encouraging vaccination of HCP against diphtheria in compliance with routine adult vaccine schedules [\[10\]](#) [\[11\]](#);
2. in addition to using Standard Precautions, placing patients with known or suspected respiratory diphtheria on Droplet Precautions and placing patients with known or suspected cutaneous diphtheria on Contact Precautions [\[12\]](#);
3. rapidly diagnosing and treating patients with clinical infection;
4. administering postexposure prophylaxis (PEP) to persons exposed to diphtheria; and
5. excluding potentially infectious HCP from work.

Guidelines for diphtheria vaccination of adults are maintained by the Advisory Committee on Immunization Practices (ACIP) in [DTaP/Tdap/Td ACIP Vaccine Recommendations](#) (<https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/dtap.html>). [\[13\]](#)

Occupational Exposures

Transmission of diphtheria occurs through the deposition of respiratory, oral, or nasal secretions, discharge from skin lesions, or, rarely, fomites from an infected source person on the mucus membranes of a susceptible host [\[2\]](#). Unprotected (e.g., not wearing a facemask), close, face-to-face contact with an infectious source person or their secretions may be considered an exposure to diphtheria. Close contact may include, but is not limited to, performing a physical examination on, feeding, or bathing a patient; bronchoscopy; intubation; or administration of bronchodilators.

Exposure to cutaneous diphtheria lesions may include unprotected contact with the lesions or their drainage, such as when changing lesion dressings or handling potentially infectious secretions without wearing recommended personal protective equipment (PPE) (i.e., gown and gloves).

Clinical Features

Diphtheria is an acute, toxin-mediated disease caused by *C. diphtheriae*. Toxin-producing strains of *C. diphtheriae* can cause a spectrum of disease ranging from mild to severe [\[14\]](#). The overall case-fatality rate for diphtheria is 5%-10%, with higher death rates (up to 20%) among persons younger than 5 and older than 40 years of age. The incubation period is usually 2-5 days, with a range of 1-10 days [\[14\]](#) [\[15\]](#).

Diphtheria can involve almost any mucus membrane [\[14\]](#). Diphtheria infection is typically classified based on the site of disease: respiratory diphtheria, including nasal, pharyngeal and tonsillar, and laryngeal diphtheria; and cutaneous diphtheria [\[15\]](#). The most common sites of respiratory diphtheria infection are the pharynx and the tonsils [\[14\]](#).

Initial symptoms of respiratory diphtheria include sore throat, difficulty in swallowing, malaise, and low-grade fever [\[2\]](#) [\[14\]](#). The hallmark of respiratory diphtheria is the presence of an exudate that organizes into a tough, grayish-white pseudomembrane over the tonsils, the pharynx,

or larynx [2] [16]. The pseudomembrane is firmly adherent to the tissue, and forcible attempts to remove it cause bleeding [14]. Cutaneous diphtheria may be characterized by a scaling rash or by ulcers with clearly demarcated edges [14].

The most frequent complications of diphtheria are airway obstruction, myocarditis, and polyneuropathy. Most complications are attributable to effects of the toxin, which affects organs and tissues distant from the site of invasion [14] [16].

Treatment for diphtheria is begun at the first sign(s) of clinical illness [1] [14] [17].

Testing and Diagnosis

Diagnostic tests used to confirm infection include isolation of toxin-producing *C. diphtheriae* by culture and toxigenicity testing. Although no other tests for diagnosing diphtheria are commercially available, CDC can perform polymerase chain reaction (PCR) testing on clinical specimens to assist with identifying a toxigenic strain [2]. Information regarding diphtheria testing is available on the [CDC Diphtheria: Laboratory website](https://www.cdc.gov/diphtheria/laboratory.html) (<https://www.cdc.gov/diphtheria/laboratory.html>). [18]

Postexposure Prophylaxis

PEP for diphtheria includes receipt of diphtheria vaccine and a single dose of intramuscular benzathine penicillin G or a 7- to 10-day course of oral erythromycin [1] [19] [20]. Detailed information regarding the dosage and administration of postexposure vaccine and antimicrobial therapy is available in CDC's [Information for Close Contacts: Diphtheria worksheet](https://www.cdc.gov/diphtheria/downloads/appendix-4-close-contact-form.pdf) [PDF](#) (https://www.cdc.gov/diphtheria/downloads/appendix-4-close-contact-form.pdf). [19]

Administration of PEP or treatment for diphtheria does not always eliminate the carrier state [21] [22] [23] [24]. For HCP identified as toxin-producing *C. diphtheriae* carriers, positive post-treatment cultures typically prompt administration of additional courses of treatment. CDC's [Information for Close Contacts: Diphtheria worksheet](https://www.cdc.gov/diphtheria/downloads/appendix-4-close-contact-form.pdf) [PDF] (https://www.cdc.gov/diphtheria/downloads/appendix-4-close-contact-form.pdf) provides additional information on the management of toxin-producing *C. diphtheriae* carriers [15] [19]. Administration of PEP among contacts is generally discontinued upon culture confirmation of non-toxin-producing *C. diphtheriae* in the index case.

Abbreviations

- ACIP = Advisory Committee on Immunization Practices
- CDC = Centers for Disease Control and Prevention
- HCP = Healthcare Personnel
- PCR = Polymerase Chain Reaction
- PEP = Postexposure Prophylaxis
- PPE = Personal Protective Equipment
- Tdap = Tetanus, Diphtheria, Pertussis

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Group A *Streptococcus*



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