

DIPHTHERIA

REPORTING INFORMATION

- **Class A:** Report immediately via telephone the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism: *Immediately via telephone.*
- The [CDC Diphtheria Surveillance Worksheet](#) is available for use to assist local health department disease investigation and contact tracing activities.
- Additional reporting information, with specifics regarding the key fields for the Ohio Disease Reporting System (ODRS) Reporting can be located in [Section 7](#).

AGENT

Corynebacterium diphtheriae; two strains, one toxigenic and one non-toxigenic, each can cause disease.

CASE DEFINITION

Clinical Description

An upper respiratory tract illness with an adherent membrane of the nose, pharynx, tonsils, or larynx.

Laboratory Criteria for Diagnosis

- Isolation of *Corynebacterium diphtheriae* from the nose or throat, or
- Histopathologic diagnosis of diphtheria.

Case classification:

Probable: a clinically compatible case that is not laboratory confirmed *and* is not epidemiologically linked to a laboratory-confirmed case.

Confirmed: a clinically compatible case that is either laboratory confirmed *or* epidemiologically linked to laboratory-confirmed case.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case.

Comment

Cutaneous diphtheria should not be reported. Respiratory disease caused by non-toxigenic *C. diphtheriae* should be reported as diphtheria.

SIGNS AND SYMPTOMS

Diphtheria is often described according to the site of membrane involvement: nasal; tonsillar and pharyngeal; laryngeal; and non-respiratory, which includes skin wounds, conjunctival and genital lesions.

Respiratory diphtheria has a gradual onset and is characterized by a mild fever (rarely $>101^{\circ}$ F or $>38.3^{\circ}$ C), sore throat, difficulty in swallowing, malaise, loss of appetite, and if the larynx is involved, hoarseness may occur.

The hallmark of respiratory diphtheria is the presence of a membrane that appears within 2–3 days of illness over the mucous membrane of the tonsils, pharynx, larynx, or nares,

and which can extend into the trachea. The membrane is firm, fleshy, grey, and adherent, and bleeds following attempts to remove or dislodge it.

Tonsillar and pharyngeal diphtheria begins with malaise, anorexia, sore throat and low-grade fever. Within 24 hours a whitish-grey or bluish-white membrane begins forming in the throat. When completely formed, the membrane may include one or both tonsils, uvula, soft palate and pharyngeal wall. Various degrees of cervical adenitis and peradenitis may be observed. In mild cases the membrane sloughs off in seven to ten days, and recovery is uneventful. Severe disease is characterized by increased toxemia and can result in death within six to ten days.

Laryngeal diphtheria is generally an extension of pharyngeal infection. It can also result from separate involvement. Onset is characterized by fever, hoarseness and cough. Obstruction of the airway is increased. In mild cases the membrane is coughed up in six to ten days. Occasionally the membrane extends downward and involves the tracheobronchial tree.

DIAGNOSIS

The initial diagnosis of diphtheria should be made on the basis of clinical findings because any delay in therapy poses a serious risk to the patient.

In patients, suspect cases and contacts, cultures should be taken from the nasopharynx as well as the throat, since 20% of positive cultures can be missed when only one site is cultured. Nasopharyngeal cultures should be obtained with a flexible alginate swab that reaches deep into the posterior nares. Throat cultures are taken with a cotton swab which is firmly applied to any area with a membrane or inflammation. For asymptomatic patients, the tonsillar fossae, posterior pharynx and retrouvular areas should be sampled as well as the nasopharynx. Before cultures of wounds are taken, the lesions should be cleansed with sterile, normal saline and crusted material should be removed. A cotton-tipped applicator is then firmly applied to the base of the wound.

Contact the ODH Laboratory at 614-728-0544 (Monday – Friday; 8 AM – 5 PM) for CDC submission criteria.

EPIDEMIOLOGY

Source

Humans.

Occurrence

Considered a disease of colder months. Most cases are seen in inadequately or unimmunized children <15 years of age and also in adults with inadequate immunization. Rarely found in infants.

Mode of Transmission

The disease is contracted through contact with an infected individual or a carrier. Bacteria are spread person-to-person through oral or respiratory droplets by coughing, sneezing or even talking – close physical contact.

Period of Communicability

Communicability varies, but is usually two weeks or less and seldom more than four weeks. Chronic carriers (which are rare) might shed organisms for six months or more.

Incubation Period

Generally 2 to 5 days, but may range from 1 to 10 days.

PUBLIC HEALTH MANAGEMENT

Case

Watch for any suspect cases in the same geographic area among those who are inadequately immunized.

Treatment

Antitoxin should be given immediately, preferably intravenously, after testing to rule out hypersensitivity. The dosage depends upon the duration of symptoms, area of involvement and severity of the disease. Both penicillin and erythromycin are effective against the organism but should be administered only after cultures are taken, in conjunction with, but not as a substitute for antitoxin.

Following recovery, approximately 50% of patients will show immunity for at least a year. Second attacks, although rare, are a possibility. Therefore, appropriate immunization should be carried out following recovery.

Isolation

According to the Ohio Administrative Code (OAC 3701-3-13, (I)), "a person with diphtheria shall be isolated until two cultures, from both throat and nose, and additionally, in the case of cutaneous diphtheria, a culture from skin lesions, are negative for diphtheria bacilli. Cultures shall be taken not less than twenty-four hours apart, and not less than twenty-four hours after cessation of antimicrobial therapy. If culturing is unavailable or impractical, isolation may be ended after fourteen days of effective antimicrobial therapy."

Contacts

Intimate and household contacts need to be identified immediately. Others with direct exposure history should be identified, such as healthcare staff exposed to the patient's nasopharyngeal secretions and children care for by the infected individual. Regardless of their immunization status, contacts should be 1) under surveillance for 7 days for evidence of disease; 2) cultured for *C. diphtheriae*; 3) given antimicrobial prophylaxis with either oral erythromycin for 10 days or a single intramuscular injection of penicillin G. Contacts previously immunized should be given a booster dose of DTaP, DT, Td, or Tdap as age appropriate. (Please note that Tdap is currently only licensed for use in a single booster dose.)

Prevention and Control

The most effective prevention and control of diphtheria is accomplished through widespread routine immunization. For details consult the ODH Vaccine Protocol Manual. Children should be vaccinated against diphtheria with the DTaP (diphtheria toxoid in combination with tetanus toxoid and acellular pertussis) vaccine. This vaccine should be given at 2, 4, 6 and 15 to 18 months of age, and between 4 and 6 years of age. Adults with uncertain histories of a complete primary vaccination series with diphtheria and tetanus toxoid-containing vaccines should begin or complete a primary vaccination series. Older children and adults who have completed the primary series should receive Td (tetanus/diphtheria) boosters every 10 years to maintain immunity. It is recommended that for both adolescents (11-18 years of age), anyone in close contact

with infants and adults <65 years of age, Tdap (tetanus/diphtheria/acellular pertussis) be used for one of those boosters to provide protection against pertussis. Please see CDC for the most current Advisory Committee on Immunization Practices (ACIP) recommendations at: <http://www.cdc.gov/vaccines/>.

Ohio School Requirement: All children entering school must have received a minimum of four doses of the DTaP vaccination series with a minimum of 4 doses if the last dose was received after the fourth birthday. In 2010 a new progressive requirement was added for 7th grade entry to include a Td (preferably Tdap) booster dose.

What is diphtheria?

Diphtheria is a disease caused by the bacteria *Corynebacterium diphtheriae* that affects the tonsils, throat, nose or skin. It is the toxin (poison) produced by the bacteria that causes the severe disease problems.

Who gets diphtheria?

The disease is often found among adults whose immunization was neglected, and is most severe in unimmunized or inadequately immunized individuals.

How is diphtheria spread?

Diphtheria is transmitted to others through close contact with the discharges from an infected person's nose, throat, eyes and skin lesions. Rarely transmission may occur after contact with articles soiled by the discharges from the nose, throat or skin lesions.

What are the symptoms of diphtheria?

Infection of the nose and throat causes symptoms such as fever, sore throat, and tiredness. The infection in the throat may cause a membrane to develop on the tonsils that could make breathing difficult for the individual. If significant toxin is produced by the bacteria, the individual can develop other complications, such as myocarditis (inflammation of heart muscle) and neuritis (inflammation of nerves). A diphtheria infection in the skin causes a scaling rash or ulcerative lesions. Generally the diphtheria bacteria found in recent cases of diphtheria skin infections has not produced the harmful toxin.

How soon do symptoms appear?

Symptoms usually appear 2 to 5 days after infection, with a range of 1 to 10 days.

What are the complications associated with diphtheria?

The diphtheria bacteria can produce a toxin that can spread from the primary site of infection (the throat) throughout the body. The toxin can cause complications such as myocarditis (inflammation of heart muscle), neuritis (inflammation of nerves), and blood disorders. Death occurs in 5 to 10% of infected individuals.

When and for how long is a person able to spread diphtheria?

Unless treated with antibiotics, people who are acutely infected with the diphtheria bacteria may be contagious for up to two weeks, but seldom more than four weeks. If the patient is treated with appropriate antibiotics, this can quickly stop the spread of the bacteria.

Does past infection with diphtheria make a person immune?

Recovery from diphtheria is not always followed by lasting immunity.

Is there a vaccine for diphtheria?

Yes. Children should be vaccinated against diphtheria with the DTaP (diphtheria toxoid in combination with tetanus toxoid and acellular pertussis) vaccine. This vaccine should be given at 2, 4, 6 and 15 to 18 months of age, and between 4 and 6 years of age. Adults with uncertain histories of a complete primary vaccination series with diphtheria and

tetanus toxoid-containing vaccines should begin or complete a primary vaccination series. Older children and adults who have completed the primary series should receive Td (tetanus/diphtheria) boosters every 10 years to maintain immunity. It is recommended that for both adolescents (11-18 years of age), anyone in close contact with infants and adults <65 years of age, Tdap (tetanus/diphtheria/acellular pertussis) be used for one of those boosters to provide protection against pertussis. Please see the CDC for the most current Advisory Committee on Immunization Practices (ACIP) recommendations at: <http://www.cdc.gov/vaccines/>.

How can diphtheria be prevented?

The single most effective control measure for diphtheria is maintaining the highest possible level of immunization in the community. Other methods of control include the prompt treatment of cases and surveillance for cases.

What is the treatment for diphtheria?

Certain antibiotics, such as penicillin and erythromycin, can be prescribed for the treatment of diphtheria. A diphtheria antitoxin is also used for treatment.

What can be the effect of not being treated for diphtheria?

If diphtheria goes untreated, serious complications such as paralysis, heart failure and blood disorders may occur. Death occurs in approximately 5 to 10% of all cases.