



DIPHTHERIA

1. **Agent:** *Corynebacterium diphtheriae*, a Gram-positive bacillus (Klebs-Loeffler).
2. **Identification:**
 - a. **Symptoms:** An acute disease of pharynx, tonsils, larynx or nose, occasionally other mucous membranes or skin, characterized by an adherent grayish membrane. Symptoms include sore throat, large tender cervical lymph nodes, and marked swelling and edema of neck ("bull neck"). A toxin is responsible for the systemic manifestations. Late effects of the toxin include cranial and peripheral motor and sensory nerve palsies, myocarditis, and nephropathy. Cutaneous diphtheria (wounds, burns) usually appears as a localized ulcer.
 - b. **Differential Diagnosis:** Bacterial and viral pharyngitis, Vincent's angina, infectious mononucleosis, syphilis, and candidiasis.
 - c. **Diagnosis:** Culture of *C. diphtheriae* from nasopharyngeal swabs on Loeffler's media.
3. **Incubation:** 2-5 days, occasionally longer.
4. **Reservoir:** Human.
5. **Source:** Discharges from nose, throat, skin, eye and other lesions of infected persons.
6. **Transmission:** Contact with patient or carrier; fomites. Raw milk has served as a vehicle.
7. **Communicability:** Variable until virulent bacilli disappear; usually 2 weeks or less, seldom more than 4 weeks. Effective antibiotic therapy reduces communicability to less than 4 days. Carriers may shed organisms for 6 months or more.
8. **Specific Treatment:**
 - a. **Case:** Diphtheria antitoxin (DAT) should be given on the basis of clinical diagnosis; do not wait for bacteriological confirmation. Currently, the only DAT available in the U.S. is a product made in Brazil. This product is available to U.S. physicians under an FDA-approved Investigational

New Drug (IND) protocol. Physicians requesting DAT should contact the LA County Acute Communicable Disease Control Duty Officer (213-240-7941 regular business hours; 213-974-4321 after-hours) who will initiate procedures to obtain DAT from the CDC Quarantine Station at Los Angeles International Airport.

Appropriate antibiotic therapy with erythromycin or penicillin should be given in conjunction with antitoxin to eradicate the organism and reduce the period of communicability. (Treatment regimens can vary; consultation with infectious disease experts is recommended.)

- b. **Carriers:** Appropriate antibiotic therapy as for all primary contacts to case (see section 2. under contacts below).
9. **Immunity:** None.

REPORTING PROCEDURES

1. Report confirmed or suspected case immediately by telephone (Title 17, Section 2500, *California Code of Regulations*). Call ACDC during working hours. After working hours, contact the Administrative Officer of the Day through County Operator.
2. **Report Form: DIPHTHERIA CASE REPORT (DHS 8579, 7/04 fillable).**
3. **Definitions:**
 - a. **Case:** has an upper respiratory tract illness characterized by sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose, without other apparent cause and is culture positive for virulent *C. diphtheriae*. A patient with a negative culture and classical symptoms may be considered a case.
 - b. **Contact:** has had face-to-face contact to a case within 5 days of case's onset.
 - c. **Carrier:** is an asymptomatic primary contact with positive culture.



- d. **Chronic carrier:** has been free from the symptoms of diphtheria for 4 weeks or longer and who harbors virulent diphtheria bacilli. Consider as a case.

NOTE: When *C. diphtheriae* or other diphtheroids are seen on smears from colonies on the Loeffler's medium, the Laboratory reports this as positive. However, confirmation requires further biochemical studies. The ultimate test of significance is a virulence test.

4. **Epidemiologic Data:**

- a. Date of onset.
- b. Clinical history, signs and symptoms, nature and location of membrane, history of contact.
- c. Laboratory data.
- d. Immunization history of case: dates, dose, and type.
- e. Identification of household contacts.
- f. Treatment: antitoxin, date, hour, units, route administered, manufacturer. Other medications; dosage dates.
- g. Travel history 2 weeks prior to onset, contact with travelers or immigrants (within incubation period).
- h. Probable source.

CONTROL OF CASE, CONTACTS & CARRIERS

Immediate investigation required.

CASE OR SUSPECT:

1. **Isolation:** Strict.
2. Release after 2 negative nose and throat cultures, taken not less than 24 hours apart and at least 24 hours after antibiotic treatment stopped.
3. Isolation may be terminated if bacilli are not virulent (*California Code of Regulations, Section 2566*).

4. If case dies, refer to **Part III, MORTICIANS AND CEMETERIES**.

CONTACTS:

Persons who have had face-to-face contact to a case within 5 days of case's onset.

1. Members of the family and intimate contacts should be examined, cultured (nose and throat) and placed under modified quarantine. (See **Part I, Section 13, Quarantine**.) Area Medical Director notifies Public Health Investigation. All household and close contacts should be given a diphtheria toxoid booster, (DTaP, DT or Td).
2. A fully immunized person exposed to a case or carrier should be given a booster dose of a preparation containing diphtheria toxoid, if they have not received one within 5 years. Close contacts, regardless of their immunization status, should receive antimicrobial prophylaxis with oral erythromycin (40-50 mg/kg per day for 7 days, maximum 2 g/day) or a single IM dose of penicillin G benzathine (600,000 U for persons weighing less than 30 kg and 1.2 million U for persons weighing 30 kg or more).
3. All under-immunized contacts (defined as having received less than 3 doses of diphtheria toxoid or whose immunization status is unknown) should be immunized according to the Advisory Committee on Immunization Practice's requirement for their age. They should also receive antibiotic prophylaxis with oral erythromycin (40-50 mg/kg per day for 7 days, maximum 2 g/day) or a single IM dose of penicillin G benzathine (600,000 U for persons weighing less than 30 kg and 1.2 million U for persons weighing 30 kg or more).
4. Search for unreported and atypical cases among contacts; restrict and treat.
5. A nurse or physician visits all contacts under quarantine daily to observe and detect suspect cases. Symptomatic contacts are isolated until cultures rule out diphtheria. Begin antitoxin at first signs of illness.
6. Release 7 days after last exposure to case or carrier.



7. Contacts who work in a sensitive occupation and school children should be removed from work or school until adequately prophylaxed as above.

CARRIERS:

Routine and Chronic.

1. If carrier is a contact to a virulent case, isolate until carrier's virulence is determined. Carriers with positive virulence should be handled as a case.
2. A carrier with negative virulence or whose contact was to an avirulent case may be treated with antibiotic therapy as for all primary contacts and released after 7 days from case's onset.

PREVENTION-EDUCATION

1. Stress importance of routine immunization of all. Immunization required for school entry. California law requires exclusion from school if immunization status does not comply with *California Code of Regulations*, Title 17, regulations.
 - a. An assessment of immunization levels in the community should be initiated. Special outreach clinics and increased health education should be made available to susceptible populations. Immunize high-risk groups including household or intimate contacts, personnel working with cases or carriers, hospital personnel including nurses and medical students, school contacts.
 - b. Primary immunization advised for cases and carriers who have received antitoxin.
2. Use pasteurized milk.
3. Disinfect fomites and discharges from lesions.

DIAGNOSTIC PROCEDURES

1. **Culture:** Call Public Health Laboratory, General Bacteriology Section.

Container: Diphtheria Culture Kit.

Laboratory Form: Test Requisition and Report Form H-3021 or online request if

electronically linked to the Public Health Laboratory.

Examination Requested: Diagnosis or release.

Material: Nose and throat swab submitted on separate slants. Inoculate slant and discard swab. For symptomatic cases, material should be obtained from beneath the membrane, or a portion of the membrane should be submitted for culture.

Hand carry to Public Health Laboratory as soon as possible, within 8 hours after inoculation. Indicate time specimen was inoculated.

If above not possible, incubate at 35°C (95°F) for 18-24 hours, then hand-carry to Public Health Laboratory. Indicate hours incubated.

2. Virulence Testing:

- a. Noncutaneous Case: If *C. diphtheriae* is found on cultures of nose or throat specimens, isolate should be sent to the State Laboratory for virulence testing.
- b. Cutaneous Case: Virulence testing is not recommended. Organisms isolated from recent cases of cutaneous diphtheria in the United States have been nontoxicogenic.
- c. Carrier: If carrier is a contact to a virulent case, then carrier's specimen should be sent to the State Laboratory for virulence testing. Virulence testing is not recommended for specimens obtained from a carrier whose contact was to an avirulent case.