

Unprotected People #63

Diphtheria

Pennsylvania Man's Death from Diphtheria Underscores the Importance of Vaccination for International Travelers

On October 24, 2003, the Centers for Disease Control and Prevention (CDC) issued an Official Health Advisory, "Respiratory Diphtheria in a Pennsylvania Resident Recently Returned from Haiti." The advisory recounted the experience of a 63-year-old man who had contracted diphtheria earlier in October while visiting Haiti. (To access the advisory from the CDC website, go to: <http://www.phppo.cdc.gov/HAN/ArchiveSys/ViewMsgV.asp?AlertNum=00161>)

Following publication of the advisory, the man died. An article describing his case, "Fatal Respiratory Diphtheria in a U.S. Traveler to Haiti—Pennsylvania, 2003," appears in the January 9 issue of "Morbidity and Mortality Weekly Report" (MMWR). It includes the case report, as well as information about diphtheria diagnosis, treatment, and prevention.

The case report is based on information from the Pennsylvania Department of Health and CDC. The MMWR article is reprinted below in its entirety, excluding references.

Fatal Respiratory Diphtheria in a U.S. Traveler to Haiti—Pennsylvania, 2003

Respiratory diphtheria can be severe or fatal in unvaccinated persons; even with appropriate treatment, 5%-10% of patients with diphtheria die. For more than 50 years, vaccination against diphtheria has been recommended for children and adults in the United States. Persons who are unvaccinated or vaccinated inadequately can contract diphtheria during travel to areas where the disease is endemic [diphtheria-endemic countries are listed at www.cdc.gov/travel/diseases/dtp.htm], putting them and their close contacts at risk for severe illness. This report describes fatal respiratory diphtheria in an unvaccinated Pennsylvania resident who had visited Haiti, a country where the disease is endemic. The case highlights the need for all

international travelers to be up-to-date with all recommended vaccinations, including a primary series of diphtheria toxoid-containing vaccine.

In October 2003, the Pennsylvania Department of Health and CDC were notified of a suspected case of respiratory diphtheria in a previously healthy Pennsylvania man aged 63 years who reported that he had never been vaccinated against diphtheria. He and seven other men from New York, Pennsylvania, and West Virginia had returned from a week-long trip to rural Haiti, where they helped build a church. One day before leaving Haiti, the patient had a sore throat. Two days after his return to Pennsylvania, he visited a local emergency department (ED) complaining of a persistent sore throat and difficulty swallowing. A rapid test for group A streptococcal antigens and a test for heterophile agglutinins were negative; he received oral amoxicillin and clavulanate potassium.

On the fourth day of illness, the patient returned to the ED with chills, sweating, restlessness, difficulty swallowing and breathing, nausea, and vomiting. On examination, he was afebrile and had stridor and a swollen neck. Expiratory wheezing and diminished breath sounds in the left lung base were noted. Arterial pO₂ was 88% on room air. Radiographs of the neck and chest showed prevertebral soft-tissue swelling, enlargement of the epiglottis, and opacity of the left lung base. Initial diagnosis was acute epiglottitis with airway obstruction and impending respiratory failure. The patient was admitted to the intensive care unit; during intubation, a laryngoscopy was performed that revealed a yellow exudate on the tonsils, posterior pharynx, and soft palate, and sloughing of the anterior pharyngeal folds. During

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the next 4 days, the patient was treated with azithromycin, ceftriaxone, nafcillin, and steroids, but he became hypotensive and febrile (100.9° F [38.3° C]). Methicillin-susceptible *Staphylococcus aureus* was isolated from sputum. Culture of a throat swab specimen was negative for *Corynebacterium diphtheriae*.

On the eighth day of illness, the patient was transferred to a tertiary care facility. A chest radiograph showed infiltrates in the right and left lung bases. During tracheostomy, a white exudate consistent with *C. diphtheriae* infection was observed. The pseudomembrane covered the supraglottic structures, including the epiglottis, vallecula and piriform sinus, the postcricoid region, and glottic inlet. Gram stain of laryngeal exudates showed gram-positive rods, gram-positive cocci, and yeast. The patient continued to receive multiple antibiotics, including penicillin, vancomycin, and gentamicin; diphtheria antitoxin (DAT) was administered on the ninth day of illness. Two days later, a sample of the pseudomembrane was negative by culture but positive for *C. diphtheriae* tox genes by polymerase chain reaction (PCR) performed at CDC. After 17 days of illness, the patient had cardiac complications and died. Based on the patient's travel to a country where diphtheria is endemic, the pattern of illness, and positive PCR results, his illness was consistent with a confirmed case of respiratory diphtheria.

Investigations of close contacts were conducted in New York, Pennsylvania, and West Virginia. Close contacts were defined as persons who had been exposed to the patient's respiratory secretions or who lived in the same household as the patient. These persons included his wife, health-care providers, Haiti traveling companions, and two other persons with whom he shared accommodations on the second day of his illness. Specimens were obtained for isolation of *C. diphtheriae* and PCR testing; all culture and PCR results were negative. Close contacts were administered antibiotic prophylaxis and offered a diphtheria toxoid-containing vaccine if they had not received a booster within the preceding 5 years.

Editorial Note

Diphtheria is caused by toxigenic strains of the bacterium *C. diphtheriae* and less frequently by *C. ulcerans*. Since universal vaccination began in the 1940s, diphtheria has been uncommon in the United States. In 2001, the vaccination coverage rate among children aged 19-35 months who had received 3 or more doses of diphtheria toxoid-containing vaccine was approximately 95%. However, among adults, coverage rates with decennial booster doses were lower. Testing of serum samples from participants in the Third National Health and Nutrition Examination Survey (1988-1994) indicated that the percentage of U.S. residents with protective levels (0.1 IU/ml or greater) of diphtheria antibodies decreased progressively with age, from 91% at ages 6-11 years to approximately 30% at ages 60-69 years.

During 1980-2001, a total of 53 cases of probable or confirmed respiratory diphtheria were reported to CDC; the most recent previous report from Pennsylvania was in 1992. In recent years, sporadic cases of respiratory diphtheria have continued to occur in the United States, primarily among adults. In 1996, toxigenic *C. diphtheriae* was isolated from residents of an American Indian community, and toxigenic *C. ulcerans* was isolated from an Indiana resident aged 54 years who had respiratory diphtheria. In 1999, a Washington state resident aged 75 years died from an illness clinically consistent with respiratory diphtheria; toxigenic *C. ulcerans* was isolated from a throat swab.

Respiratory diphtheria should be suspected in patients with membranous nasopharyngitis or obstructive laryngotracheitis who returned recently from areas where the disease is endemic or who were in close contact with persons who returned recently from such areas. DAT, which is available from CDC [contact the duty officer for diphtheria antitoxin, telephone (404) 639-8257, 8 a.m. to 4:30 p.m.; (770) 488-7100, after hours], should be administered as soon as diphtheria is suspected, without waiting for laboratory confirmation. Antibiotics are administered to patients suspected with diphtheria to eradicate carriage of *C.*

diphtheriae. Because diphtheria disease might not confer immunity, patients should be administered a diphtheria toxoid-containing vaccine during convalescence.

Diphtheria-infected travelers returning to the United States with incubating or untreated disease can transmit *C. diphtheriae* to their close contacts. Antibiotic prophylaxis is recommended for close contacts after nasal and pharyngeal specimens for culture are obtained. Adolescent and adult contacts who have not received a dose of a diphtheria toxoid-containing vaccine during the preceding 5 years should be vaccinated. Children should receive diphtheria and tetanus toxoids and acellular pertussis vaccine at ages 2 months, 4 months, 6 months, 12-18 months, and 4-6 years; a booster dose of tetanus and diphtheria toxoids (Td) vaccine should be administered preferably at ages 11-12 years (or ages 13-18 years for catch-up); and protection should be maintained by a regular booster of Td every 10 years.

In addition to taking destination-specific, disease-prevention precautions, all international travelers, regardless of age or destination, should ensure that they are up-to-date with all recommended vaccinations, including a primary series (i.e., 3 or more doses) of diphtheria toxoid-containing vaccine that includes a dose within the preceding 10 years. Additional information on vaccines recommended for travelers can be obtained from state health departments or CDC.

To obtain a web-text (HTML) version of the MMWR article, go to: www.cdc.gov/mmwr/preview/mmwrhtml/mm5253a3.htm