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Outbreak of Legionnaires' Disease Among Automotive Plant Workers—Ohio, 2001

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DURING MARCH 12-15, 2001, FOUR cases of Legionnaires' disease (LD) among workers at an automotive engine manufacturing plant (plant X) were reported to the Cuyahoga County Board of Health, Cleveland, Ohio; all four diagnoses were confirmed by *Legionella* urine antigen. Illness onset among the four workers occurred during March 2-4; two workers died. Beginning March 14, CDC assisted state and local health departments with an investigation to identify new cases and potential sources of *Legionella* transmission in the plant. This report summarizes the investigation; findings indicate an epidemiologic association with exposure to one of the plant finishing lines but did not identify a specific source.

Plant X manufactures cast iron engine components, is operated by approximately 2500 employees, and covers approximately 1.6 million square feet of floor space. The plant is divided into four areas: core making, mold production, iron melting, and finishing. A confirmed case of LD was defined as radiograph-confirmed pneumonia and laboratory evidence of *Legionella* infection, defined as a positive *Legionella* urine antigen or isolation of *Legionella* from respiratory secretions or lung tissue. Specimens from the four initial case-patients were sent to CDC for isolation of *Legionella*; available specimens included one sputum specimen, one broncho-alveolar lavage specimen, and lung tissue from the two decedents. Active LD surveillance was established in all hospitals in the greater Cleveland area. Hospital records and plant X employee absentee records were reviewed to identify additional cases. An environmental investigation was conducted to identify aerosol-producing water sources for *Legionella* transmission, including cooling towers, water hoses, and water heaters.

No additional confirmed LD cases were identified among the workers. Nine workers from plant X were hospitalized during February 14–March 28; four had pneumonia, and all nine had negative *Legionella* urine antigen tests. *Legionella* pneumophila, serogroup 1, was isolated from a worker's sputum sample, which was stored at 40°F (4°C) for greater than1 week before culture. Results are pending from lung tissue samples. *Legionella* was isolated from 18 (9%) of 197 environmental samples, and at least five species were identified. Three samples grew *L. pneumophila*, serogroup 1; none matched the clinical isolate by monoclonal antibody staining.

A case-control study was conducted to determine risk factors for exposure to *Legionella* among plant workers. A case-patient was defined as a worker at plant X during February 14–March 28 who had either a confirmed case of LD or a possible case of legionellosis. A possible case-patient of legionellosis was defined as a worker with a titer of anti-legionella IgG antibody ≥1:1024 and any two of the following symptoms: cough, shortness of breath, fever, headache, myalgia, or fatigue. Controls were randomly selected workers with fewer than two symptoms and IgG antibody ≤1:64. Serologic specimens were collected 4-5 weeks after the presumed exposure. Each study participant was asked detailed questions about time spent inside and outside of the plant and information about underlying medical conditions associated with LD.

Among 855 workers who were contacted, 484 (57%) agreed to participate in the case-control study; 11 met case criteria (four confirmed and seven possible cases), and 105 met criteria for controls. Visiting one of the finishing lines in the plant (odds ratio [OR] = 15.1; 95% confidence interval [CI] = 3.0-76.2) and working in the finishing region of the plant (OR = 3.8; CI = 1.0-13.8) were associated with disease.

Plant X was closed during March 14-19 to facilitate environmental sampling and decontamination. All water systems were decontaminated, and ongoing environmental surveillance for *Legionella* was implemented throughout the plant, including the finishing area. Sources of aerosolized water from the finishing area that had been sampled before decontamination did not yield cultures positive for *Legionella*. On the basis of the case-control study results, additional environmental samples were collected in the finishing area on April 14; all samples were negative for *Legionella*. County health officials are obtaining maintenance records from the implicated area of plant X to determine how transmission might have occurred.

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CDC Editorial Note: Industrial plants can be a source for the propagation and transmission of *Legionella*. The identification of *L. pneumophila* in the environmental samples demonstrated that legionellae can survive in this work environment. The tightly clustered onset of illness, lack of other epidemiologic associations among the four

confirmed patients besides working in plant X, and the results of the case-control study implicated a particular finishing line within the plant as the likely source of *Legionella*. The narrow period of illness onset and the failure to identify new cases among plant workers suggest that exposure to the infecting *Legionella* strain was short-lived and transient, which may explain the failure to find an environmental sample that matched the clinical isolate.

LD outbreaks have been reported in industrial settings, including an automotive plant where workers were exposed to contaminated metal-working fluids,[1] factories that used water to cool molded plastics,[2] and waste-water treatment facilities.[3] In each setting, an aerosol-producing device was implicated. Guidelines to minimize the risk for *Legionella* transmission in these sites are available.[4] In addition to LD, clinicians should consider hypersensitivity pneumonitis, metal fume fever, and humidifier fever as possible diagnoses of an acute febrile respiratory illness with systemic symptoms in persons who work in an industrial setting.[5]

Legionella species are estimated to account for 2%-15% of all community-acquired pneumonia; however, only 1200-1500 cases are reported annually.[6,7] Appropriate diagnostic testing for LD includes *Legionella* urine antigen and culture of respiratory secretions. *Legionella* urine antigen tests provide rapid and accurate diagnosis of disease caused by *L. pneumophila*, serogroup 1; however, these tests do not identify less common species or serogroups and do not provide an isolate necessary to compare clinical with environmental isolates during outbreak investigations. LD also can be diagnosed by a four-fold rise in anti-legionella antibody titer or by direct fluorescent antibody on sputum samples, although the latter method lacks specificity and sensitivity. In addition to testing for *Legionella* urine antigen, the diagnosis and investigation of LD cases would be improved if clinicians obtained respiratory specimens for culture by a laboratory proficient in *Legionella* isolation. To facilitate appropriate investigation and improve understanding of disease associated with *Legionella* species, health-care providers should report legionellosis cases to county or state health departments, and state health departments should report legionellosis cases to CDC.

REFERENCES

7 available

Deferral of Routine Booster Doses of Tetanus and Diphtheria Toxoids for Adolescents and Adults

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A SHORTAGE OF TETANUS AND DIPHTHERIA toxoids (Td) and tetanus toxoid (TT) in the United States has resulted because one of two manufacturers discontinued production of tetanus toxoid–containing products.[1] Aventis Pasteur (Swiftwater, Pennsylvania) is the only major manufacturer of tetanus and Td in the United States. In response to the shortage, Aventis Pasteur has increased production of Td to meet national needs; however, because 11 months are required for vaccine production, the shortage is expected to last for the remainder of 2001.

To assure vaccine availability for priority indications,[2] all routine Td boosters in adolescents and adults should be delayed until 2002. Td use should follow existing recommendations for all other indications, which include (1) persons traveling to a country where the risk for diphtheria is high*; (2) persons requiring tetanus vaccination for prophylaxis in wound management; (3) persons who have received <3 doses of any vaccine containing Td; and (4) pregnant women who have not been vaccinated with Td during the preceding 10 years.

CDC recommends that health-care providers, including clinic personnel, record the names of patients whose booster dose is delayed during the shortage. When Td supplies are restored, these patients should be notified to return to their health-care provider for vaccination. According to Aventis Pasteur, sufficient vaccine will be available in early 2002 to supply the national demand.

Health-care providers using Td for wound management should follow recommendations from the Advisory Committee on Immunization Practices for wound management.[3] All wound patients should receive Td if they have received <3 tetanus-containing vaccines or if vaccination history is uncertain. These patients also should receive tetanus immune globulin for wounds that are contaminated with dirt, feces, soil or saliva, puncture wounds, and avulsions and wounds resulting from missiles, crushing, burns or frostbite.[3] For persons with ≥3 doses of TT-containing vaccine and severe or contaminated wounds, Td should be given only if >5 years have passed since the last dose of tetanus-containing vaccine. For clean and minor wounds, Td should be given only if the patient has not received a tetanus-containing vaccine during the preceding 10 years. Health-care providers should inquire from patients presenting for wound management about the timing of their last tetanus-containing vaccine to avoid unnecessary vaccination.

Pediatric formulations of diphtheria and tetanus toxoids (DT) and diphtheria and tetanus toxoids and acellular pertussis vaccine (DTaP) should not be used for persons aged ≥7 years. Although TT might be considered a substitute for Td in wound management when Td is not available, TT is not available for national distribution. Existing stocks of TT are extremely limited and are mainly reserved for production of tetanus immune globulin and other special circumstances.

Health-care providers and institutions requiring Td for priority indications should contact Aventis Pasteur, telephone (800) 822-2463 or (800) VACCINE. Institutions should place orders for their anticipated needs for priority indications only. Limiting quantities of vaccine in each order is necessary to assure the widest possible distribution of available vaccine. For emergency situations (e.g., natural disasters) requiring increased use of Td, Aventis Pasteur can provide vaccine within 24 hours.

REFERENCES

3 available

*Travelers to certain countries may be at substantial risk for exposure to toxigenic strains of *C. diphtheriae*, especially with prolonged travel, extensive contact with children, or exposure to poor hygiene. Based on surveillance data and consultation with the World Health Organization, countries at highest risk are: Africa=Algeria, Egypt, and sub-Saharan Africa; Americas=Brazil, Dominican Republic, Ecuador, and Haiti; Asia/Oceania=Afghanistan, Bangladesh, Cambodia, China, India, Indonesia, Iran, Iraq, Laos, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Syria, Thailand, Turkey, Vietnam, and Yemen; Europe=Albania and all countries of the former Soviet Union.[3]

Update: Outbreak of Acute Febrile Respiratory Illness Among College Students—Acapulco, Mexico, March 2001

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ON MARCH 30, CDC WAS NOTIFIED BY the Pennsylvania Department of Health of an acute febrile respiratory illness characterized by fever, chills, dry cough, chest pain, and headache among college students who traveled to Acapulco during March 2001. Initial laboratory testing indicated that most students had histoplasmosis, an infection caused by the soil-inhabiting fungus, *Histoplasma capsulatum*. While in Acapulco, most ill students had stayed at the Calinda Beach Hotel. This report updates the investigation of the outbreak and presents possible evidence of ongoing transmission.[1]

As of May 1, 44 colleges in 22 states* and the District of Columbia have reported 229 students with acute febrile respiratory illness defined by fever for at least 3 days and one or more of the following symptoms: cough, shortness of breath, chest pain, or headache. Laboratory testing of serum specimens from many of these students is ongoing to confirm the cause of illness. Confirmation of histoplasmosis ideally requires testing of acute- and convalescent-phase serum specimens using complement fixation and immunodiffusion methods.[2]

To determine where the infection may have been acquired, a cohort study was conducted among students who stayed at three different hotels in Acapulco during the first 2 weeks of March. A total of 109 randomly selected students were interviewed using a standardized questionnaire about symptoms, daily activities, and environmental exposures while in Acapulco. Thirty-one students stayed at the Calinda Beach Hotel, and 78 stayed at other hotels; 58 (53%) were women, and the median age was 21 years (range: 17-25 years). Univariate analysis indicated that having stayed at the Calinda Beach Hotel was significantly associated with illness (22 [71%] of 31 versus four [5%] of 78; risk ratio [RR]=13.8; $p<0.001$). Other activities (e.g., visiting clubs and restaurants) were not associated with illness.

During April, CDC and the Mexico Ministry of Health conducted a joint investigation of the Calinda Beach Hotel and surrounding areas to determine potential sources of *H. capsulatum* (e.g., construction sites and bird and bat roosts). No sources at the hotel or in its vicinity were identified. Reports of illness in travelers who visited the hotel during April are continuing to be obtained and investigated. To identify specific sources of infection, a cohort study is being conducted among college students who stayed at the hotel during March. This study involves administration of a detailed questionnaire about activities in and near the Calinda Beach Hotel and collection of serum specimens from ill and non-ill visitors. Environmental samples were collected from areas in and around the hotel that were frequented by the students; testing of these environmental specimens for *H. capsulatum* is difficult and requires intraperitoneal mouse inoculation. CDC is awaiting results of the cohort study to determine which samples to test.

On May 3, CDC was notified about two cases of histoplasmosis in a couple from California who had traveled to Acapulco during April 9-16 and had stayed at the Calinda Beach Hotel. The couple, both aged 26 years, had onset of symptoms consistent with acute histoplasmosis 8 days after returning from Acapulco. Urine antigen test for histoplasmosis[3] at the Histoplasmosis Reference Laboratory (Indianapolis, Indiana) was positive for both persons. Although this test is not sensitive for diagnosis of acute pulmonary histoplasmosis, the test is very specific. These cases suggest ongoing transmission of histoplasmosis associated with the hotel.

Visitors to the Calinda Beach Hotel should be aware of the risk for histoplasmosis and should contact their physicians if they develop symptoms. Physicians should contact CDC's Mycotic Diseases Branch, telephone (404) 639-1299 or e-mail: zqg9@cdc.gov. Until further information is available, U.S. visitors to Acapulco are advised to avoid the area of the Calinda Beach Hotel.

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REFERENCES

3 available

*Arizona, Connecticut, Delaware, Florida, Illinois, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Dakota, Texas, and Wisconsin.