Update: Outbreak of Rift Valley Fever—Saudi Arabia, August-November 2000

ON SEPTEMBER 10, 2000, THE MINISTRY OF HEALTH (MOH), Kingdom of Saudi Arabia and subsequently, the MOH of Yemen began receiving reports of unexplained hemorrhagic fever in humans and associated animal deaths and abortions from the far western Saudi-Yemeni border region. These cases subsequently were confirmed as Rift Valley fever (RVF), the first such cases on the Arabian peninsula. This report updates the findings of the ongoing investigation conducted by the Saudi Arabian MOH in collaboration with CDC and the National Institute of Virology, Johannesburg, South Africa.

As of November 1 in Saudi Arabia, 516 persons with suspected severe RVF requiring hospitalization have been reported from primary health-care centers and hospitals; 87 (17%) have died. Suspected cases have been identified through an elaborate pre-existing system of primary health-care centers that refer acutely ill persons to district hospitals for assessment of hepatitis and other criteria for admission as RVF case-patients. Of the 216 suspected severe case-patients with appropriate serum samples, 206 (95%) have been laboratory confirmed by either viral antigen or IgM antibody testing. Of the 516 case-patients, 407 (79%) were male; the median age was 46 years (range: 1-95 years); the youngest confirmed patient was aged 14 years; and 424 (82%) were Saudi citizens, 80 (16%) were Yemeni citizens, and 12 (2%) were of other nationalities. The largest number of cases have been reported from the southwestern province of Jazan (365 [77%]), and 122 (24%) cases have been reported from the contiguous Asir region. Except for one case-patient in Al Quenfadh, northwest of Jazan, all other case-patients had traveled recently to Jazan or Asir.

The mean duration from disease onset to hospitalization was 3.3 days (standard deviation [SD] = ±3.2 days), and the average time from disease onset to death among the 87 fatalities was 6.3 days (SD = ±5.3 days). Of 148 case-patients at King Fahad Central Hospital in Jazan, 57 (39%) with mild to moderate RVF disease had reversible acute renal failure, requiring only supportive care for 2-14 days; 27 (18%) with severe disease required hemodialysis.

Based on preliminary data from the ongoing epidemiologic investigation, 125 (76%) of 165 case-patients reported close contact with animals, especially sheep and goats, and 91 (64%) of 143 case-patients reported a history of exposure to dead, and/or aborted animals. Nearly all persons reported having had mosquito bites and that the mosquitoes were present at their place of residence.

Entomologic studies found large numbers of two species of mosquitoes, *Culex tritaeniorhynchus* and *Aedes caspius*, in the flood irrigation farming areas at the foot of the mountains and the foothills of Al Ardah district in Jazan, where the first and most human cases were reported. Preliminary laboratory studies have already yielded isolates of RVF virus from both of these species. Further laboratory identification of the collected mosquitoes suggests the presence of additional *Aedes* species; definitive species typing is pending. A regional survey for RVF antibody prevalence in domestic ungulates, primarily goats and sheep, was conducted in Jazan and Asir provinces. RVF antibody prevalence ≥ 90% was found in Al Ardah district. RVF antibodies also were found among ungulates in other surveyed areas. A correlation was found between areas where human cases were reported and the same flood irrigation farming areas in the upper reaches of the wadis identified by the entomologists.

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ability of potential permissive vectors and animal reservoirs.

Official reports from Yemen suggest ongoing transmission over a large area, compared with the outbreak in Saudi Arabia, which is more circumscribed and is now mainly focused in Asir province. However, the differing case definitions and surveillance methodologies preclude a direct comparison of the Saudi Arabian and Yemeni outbreaks. Nevertheless, these outbreaks demonstrate disease transmission in an approximately 600 km area, including the flood plains of the wadis extending from the Sarawat mountains to the Red Sea coastal plain and extending from the Hodedium governorate in Yemen to the Al Quendaiah health region in Saudi Arabia. Epidemiologic data suggest the simultaneous, extensive, and multicentric nature of the outbreaks rather than radiation of disease from a single focus in Saudi Arabia or Yemen.

Control and prevention measures are ongoing in these countries as are preparations for studies to better define risk factors for infection and severe disease, examine the risk for nosocomial infection, gauge the magnitude and scope of the outbreak, characterize viral sequences from case isolates, test the efficacy of intravenous ribavirin, and determine the prevalence of infection among captured vector species. The abundance of *A. caspius* (a floodwater breeding aedine mosquito) breeding in the flooded agricultural fields suggests that this species can act as an interepidemic (reservoir) host for the virus and an epidemic vector when heavy rains promote mosquito population expansions; *C. tritaeniorrhynchus* is probably an epidemic vector. Continued surveillance will be necessary to determine if these infected “floodwater” *Aedes*, the major vector for persistence of the virus in Africa attributed to transovarial transmission, supports establishment of RVF on the Arabian Peninsula.

*Suspected severe RVF is defined as unexplained illness >48 hours in duration associated with three of: elevation in transaminases (alanine aminotransferase, aspartate aminotransferase, and gamma glutamyl transpeptidase) or clinical jaundice; or unexplained illness >48 hours in duration associated with abortion or bleeding manifestations (e.g., from puncture sites, ecchymosis, petechiae, purpura, epistaxis, gastrointestinal bleeding, or menorrhagia); or unexplained illness >48 hours in duration associated with neurologic manifestations (e.g., vertigo, confusion, disorientation, amnesia, lethargy, hallucination, meningismus, choreiform movements, ataxia, tremor, convulsions, hemiparesis, decerebrate posturing, locked-in syndrome, or coma); or unexplained illness >48 hours in duration associated with fever, diarrhea, nausea, vomiting, or abdominal pain and any one of the following laboratory values: (1) hemoglobin <8 g/dL; (2) platelets <100,000 mm<sup>3</sup> (<10<sup>10</sup>/L); (3) LDH 2× upper limit of normal; (4) creatinine >150 mg/L; or (5) CPK 2× upper limit of normal; or unexplained death with recent history of fever during the preceding 2 weeks; and if a specimen is available, evidence of RVF-specific antigen or IgM antibody. Specimens must be obtained at least 7 days after illness onset before they can be considered negative.*

### Coccidioidomycosis in Travelers Returning From Mexico—Pennsylvania, 2000

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1 figure omitted

**Coccidioidomycosis** (CM), a fungal disease caused by *Coccidioides immitis*, is endemic in the southwestern United States and parts of Central and South America. The disease is acquired by inhaling the arthroconidia of *C. immitis* present in the soil. Outbreaks of CM occur when susceptible persons are exposed to airborne arthroconidia from dust storms, natural disasters, and earth excavation.<sup>1,2</sup> Persons who travel to areas where the disease is endemic may become infected and develop symptoms after returning home.<sup>3,4</sup> This report describes an outbreak of CM among travelers returning to Pennsylvania from a trip to Mexico.

On January 24, 2000, 35 church members from two cities in Pennsylvania traveled to Hermosillo, Mexico, where they stayed 1 week to construct a church. Within 2 weeks of returning home, 27 travelers complained of influenza-like symptoms, and initial testing of acute serum specimens at CDC revealed antibodies to *C. immitis* for one traveler.

To determine the extent of the outbreak and to identify potential risk factors for developing CM, the Pennsylvania Department of Health and CDC conducted a cohort study and collected acute and convalescent-phase serum samples from consenting church members. Serum specimens were tested for antibodies to *C. immitis* by immunodiffusion and complement fixation at CDC and the University of California–Davis. A case was defined as a positive serologic test for coccidioidal antibodies by (1) detection of coccidioidal immunoglobulin M by immunodiffusion, enzyme immunoassay (EIA) latex agglutination, or tube precipitin, or (2) detection of rising titer of coccidioidal immuno-globulin G by immunodiffusion, EIA, or complement fixation in a church member from Pennsylvania who had traveled to Hermosillo during January 24–February 2, 2000. All participants completed a standardized questionnaire about medical history, activities while in Mexico, and environmental exposures.

A questionnaire and at least one serum sample was obtained for 30 (86%) of the 35 church members. Twenty-nine (97%) were men; median age was 45 years (range: 18–62 years). Twenty-three (77%) persons reported becoming ill either in Mexico or within 3 weeks of returning home. Based on serologic testing, eight (27%) persons met the case definition for CM, seven of whom were symptomatic. The incubation period ranged from 8 days after arriving in Mexico to 15 days after returning to Pennsylvania from Mexico. The most common symptoms were fatigue, fever, arthralgias, and myalgias (71% in each). Three had a rash, and four had a cough. The median duration of symptoms was 7 days (range: 2–35). Eighteen (78%) of 23 ill persons sought care from at least one health-care provider. Twelve (67%) persons had chest radiographs performed.
as part of their evaluation; six were abnormal. Eleven of these 18 persons were prescribed medications for their symptoms; six were prescribed either fluconazole or itraconazole once it was known that a CM outbreak had occurred. One person required hospitalization in an intensive care unit for 1 day. Of 23 ill persons, 11 (48%) missed work or school for an average of 5.5 days.

No activities or other conditions were associated substantially with infection or symptomatic disease. However, 22 (73%) church members reported working in extremely dusty conditions. Nineteen (63%) persons reported histories of previous travel to Hermosillo or other areas where C. immitis is endemic; but only one case-patient reported history of such travel.

CDC Editorial Note: The outbreak in this report and a similar outbreak in a group from Washington underscore the need for increased awareness about CM and its risk factors among susceptible persons visiting areas where the disease is endemic, especially among persons who engage in construction work or other activities in dusty environments. Travel to these areas has become more common because of various missionary and other travel activities to Mexico and relocation of persons from areas in the Northwest and Midwest to the southwestern United States. In addition, CM has increased among U.S. travelers to areas where CM is endemic, especially among the elderly. Persons with certain underlying illnesses (e.g., human immunodeficiency virus [HIV] and elderly with chronic medical conditions) who travel to areas where CM is endemic are at increased risk for severe pulmonary or disseminated CM.

Approximately 40% of persons infected with C. immitis develop symptomatic disease. Most (85%) symptomatic persons present with a mild, influenza-like illness; 8% may develop severe pulmonary disease requiring hospitalization, and 7% develop disseminated, extrapulmonary disease. Risk factors for disseminated disease include black or Asian race, pregnancy, and immunocompromising conditions (e.g., acquired immunodeficiency syndrome); risk factors for severe pulmonary disease include diabetes, smoking, and older age.

Although avoiding activities that generate dust or using a mask during these activities is advisable, these measures do not provide complete protection. A potential strategy for adequate prevention is vaccine development because natural infection with C. immitis provides life-long immunity. However, until a vaccine becomes available, organizations that conduct trips to areas where CM is endemic should inform their travelers about the risks for CM. Health-care providers should consider CM in travelers returning from areas where the disease is endemic and who present with an influenza-like illness. Early diagnosis of CM will result in better use of medical resources and will help alleviate patient concerns and may prevent more severe disease.

REFERENCES

practices; and to assess potential sources of contamination from raw milk. Product and environmental samples (e.g., vat surfaces and floor drains) from the dairy plant were screened for phosphatase activity to identify evidence of raw milk.

Fifty-five laboratory-confirmed case-patients were identified, including two from secondary households. Case-patients were from seven Wisconsin counties (27 from Chippewa and 16 from Eau Claire counties); two case-patients were visiting from out of state. Median age was 27 years (range: 15 months-90 years) and 37 (67%) were female. The most frequently reported symptoms included bloody diarrhea (55 [100%]), cramps (50 [91%]), fatigue (39 [71%]), and nausea (38 [69%]).

In the prior month, 37 case-patients (67%) purchased fresh curds, which were incorrectly labeled "pasteurized" cheddar cheese from plant A. Fifteen (50%) of 30 case-patients who recalled the purchase of fresh curds, which were incorrectly labeled "pasteurized" cheddar cheese from plant A, and 24 had chased the curds from an unrefrigerated display at plant A, and 24 had purchased them refrigerated from retail stores that received shipments from plant A; 19 had purchased the curds from an unrefrigerated display at plant A, and 24 had purchased them refrigerated from retail stores that received shipments from plant A. Fifteen (50%) of 30 case-patients who recalled the purchase date had bought the curds on June 5 or 6. The median number of curds eaten was eight (range: one-28), equivalent of approximately 1.6 oz of cheese.

Thirty-five specimens from plant A that were produced during the outbreak were tested: nine environmental samples, 18 unopened cheese samples, six opened retail packages of curds, and two unopened retail packages of curds. Five of the six opened retail packages of curds and four of the 18 unopened cheese samples were positive for nonbacterial phosphatase (Scharer method). E. coli O157:H7 was isolated from an opened package of curds that had been served at a party attended by nine persons with culture-confirmed illness. The contents of this package tested positive for nonbacterial phosphatase. Among 44 E. coli O157:H7 case-patient isolates available for pulsed-field gel electrophoresis, 42 were indistinguishable from each other and from the curd isolate.

Dairy plant A had produced four or five vats of pasteurized cheddar and Colby cheese products 5 days a week since 1977. Each vat yielded approximately 1500 pounds of cheese that was pressed into 40-lb blocks, daisies (rounds of cheese), or was packaged as fresh cheese curds. Dairy plant A also produced unpasteurized (raw milk) cheddar cheese daisies every June as part of Dairy Month. Certain raw milk cheese products can be produced and sold legally as long as the cheese is held at ≥35 F (≥1.7 C) for at least 60 days before it is sold. Curds are sold fresh (held <60 days); therefore, curds must be made with pasteurized milk. At least one 1500-lb vat of raw milk cheddar cheese was made on May 27 and June 2-5. These vats were used inadvertently to make fresh curds, which were incorrectly labeled “pasteurized” cheddar cheese curds, and distributed and sold in six Wisconsin counties.

REFERENCES

*Code of Federal Regulations Title 21, Part 133.