Q Fever, Bioterrorism
Summary

SYMPTOMS
Fever, cough, and pleuritic chest pain may occur as early as ten days after exposure. Patients are not generally critically ill, and the illness lasts from 2 days to 2 weeks.

DIAGNOSIS
Q fever is not a clinically distinct illness and may resemble a viral illness or other types of atypical pneumonia. The diagnosis is confirmed serologically.

TREATMENT
Q fever is generally a self-limited illness even without treatment, but tetracycline or doxycycline should be given orally for 5 to 7 days to prevent complications of the disease. Q fever endocarditis (inflammation of the heart - rare) is much more difficult to treat.

PROPHYLAXIS
Chemoprophylaxis begun too early during the incubation period may delay but not prevent the onset of symptoms. Therefore, tetracycline or doxycycline should be started 8-12 days post exposure and continued for 5 days. This regimen has been shown to prevent clinical disease. An inactivated whole cell IND vaccine is effective in eliciting protection against exposure, but severe local reactions to this vaccine may be seen in those who already possess immunity. Therefore, an intradermal skin test is recommended to detect pre-sensitized or immune individuals.

ISOLATION AND DECONTAMINATION
Standard Precautions are recommended for healthcare workers. Person-to-person transmission is rare. Patients exposed to Q fever by aerosol do not present a risk for secondary contamination or re-aerosolization of the organism. Decontamination is accomplished with soap and water or a 0.5% chlorine solution on personnel. The M291 skin decontamination kit will not neutralize the organism.

OVERVIEW
The endemic form of Q fever is a zoonotic disease caused by the rickettsia, *Coxiella burnetii*. Its natural reservoirs are sheep, cattle, goats, dogs, cats and birds. The organism grows to especially high concentrations in placental tissues. The infected animals do not develop the disease, but do shed large numbers of the organisms in placental tissues and body fluids including milk, urine, and feces. Exposure to infected animals at parturition is an important risk factor for endemic disease. Humans acquire the disease by inhalation of aerosols contaminated with the organisms. Farmers and *abattoir* (slaughterhouse) workers are at greatest risk occupationally. A biological warfare attack with Q fever would cause a disease similar to that occurring naturally. Q fever is also a significant hazard in laboratory personnel who are working with the organism.

HISTORY AND SIGNIFICANCE
Q fever was first described in Australia and called “Query fever” because the causative agent was initially unknown. *Coxiella burnetii*, discovered in 1937, is a rickettsial organism that is resistant to heat and desiccation and highly infectious by the aerosol route. A single inhaled organism may produce clinical illness. For all of these reasons, Q fever could be used by an adversary as an incapacitating biological warfare agent.

CLINICAL FEATURES
Following the usual incubation period of 2-14 days, Q fever generally occurs as a self-limiting febrile illness lasting 2 days to 2 weeks. The incubation period varies according to the numbers of organisms inhaled, with longer periods between exposure and illness with lower numbers of inhaled organisms (up to forty days in some

cases). The disease generally presents as an acute non-differentiated febrile illness, with headaches, fatigue, and myalgias as prominent symptoms. Physical examination of the chest is usually normal. Pneumonia, manifested by an abnormal chest x-ray, occurs in half of all patients, but only around half of these, or 28 percent of patients, will have a cough (usually non-productive) or rales. Pleuritic chest pain occurs in about one-fourth of patients with Q fever pneumonia. Chest radiograph abnormalities, when present, are patchy infiltrates that may resemble viral or mycoplasma pneumonia. Rounded opacities and adenopathy have also been described.

Approximately 33 percent of Q fever cases will develop acute hepatitis. This can present with fever and abnormal liver function tests with the absence of pulmonary signs and symptoms. Uncommon complications include chronic hepatitis, culture-negative endocarditis, aseptic meningitis, encephalitis and osteomyelitis. Most patients who develop endocarditis have pre-existing valvular heart disease.

DIAGNOSIS

Differential Diagnosis: Since Q fever usually presents as an undifferentiated febrile illness, or a primary atypical pneumonia, it may be difficult to distinguish from viral illnesses and must be differentiated from pneumonia caused by *Mycoplasma pneumoniae, Legionella pneumophila, Chlamydia psittaci,* and *Chlamydia pneumoniae* (TWAR). More rapidly progressive forms of Q fever pneumonia may look like bacterial pneumonias such as tularemia or plague. Significant numbers of soldiers (from the same geographic area) presenting over a one to two week period with a nonspecific febrile illness, and associated pulmonary symptoms in about a quarter of cases, should trigger the treating physicians to consider the possibility of an attack with aerosolized Q fever. The diagnosis will often rest on the clinical and epidemiologic picture in the setting of a possible biowarfare attack.

LABORATORY DIAGNOSIS

A leukocytosis may be present in one third of patients. Most patients with Q fever have a mild elevation of hepatic transaminase levels. Identification of organisms by examination of the sputum is not helpful. Isolation of the organism is impractical, as the organism is difficult to culture and a significant hazard to laboratory workers. Serological tests for Q fever include identification of antibody to *C. burnetii* by indirect fluorescent antibody (IFA), enzyme-linked immunosorbent assay (ELISA), and complement fixation. Specific IgM antibodies may be detectable as early as the second week after onset of illness. ELISA testing is available at USAMRIID. A single serum specimen can be used to reliably diagnose acute Q fever with this test as early as 1 1/2 - 2 weeks into the illness. The most commonly available serologic test is the complement fixation test (CF) which is relatively insensitive and may not be useful if sera have intrinsic anti-complement activity.

MEDICAL MANAGEMENT

Standard Precautions are recommended for healthcare workers. Most cases of acute Q fever will eventually resolve without antibiotic treatment, but all suspected cases of Q fever should be treated to reduce the risk of complications. Tetracycline 500 mg every 6 hr or doxycycline 100 mg every 12 hr for 5-7 days will shorten the duration of illness, and fever usually disappears within one to two days after treatment is begun. Ciprofloxacin and other quinolones are active in vitro and should be considered in patients unable to take tetracycline or doxycycline. Successful treatment of Q fever endocarditis is much more difficult. Tetracycline or doxycycline given in combination with trimethoprim-sulfamethoxazole (TMP-SMX) or rifampin for 12 months or longer has been successful in some cases. However, valve replacement is often required to achieve a cure.

PROPHYLAXIS

Vaccine: A formalin-inactivated whole cell IND vaccine is available for immunization of at-risk personnel on an investigational basis, although a Q fever vaccine is licensed in Australia. Vaccination with a single dose of this killed suspension of *C. burnetii* provides complete protection against naturally occurring Q fever, and greater than 95 percent protection against aerosol exposure. Protection lasts for at least 5 years. Administration of this vaccine in immune individuals may cause severe local induration, sterile abscess formation, and even necrosis at the inoculation site. This observation led to the development of an intradermal skin test using 0.02 mg of specific formalin-killed whole-cell vaccine to detect presensitized or immune individuals.

ANTIBIOTICS

Chemoprophylaxis using Tetracycline 500 mg every 6 hours or doxycycline 100 mg every 12 hours for 5 - 7 days is effective if begun 8-12 days post exposure. Chemoprophylaxis is not effective and may only prolong the onset of disease if given immediately (1 to 7 days) after exposure.

Most of this information is courtesy of US Government. In times of an emergency much of this material may not apply when it comes to specialized care and testing. These are guidelines to help you when that care is not available. Some of this information is very technical and difficult to understand, but hopefully someone will be available for help in treatment and understanding.

Document Released: 03/09/2004 Document Re-Released: 03/14/2011
ExitCare® Patient Information ©2011 ExitCare, LLC.