TULAREMIA

Bioterrorism Agent Profiles for Health Care Workers

Causative Agent: Tularemia is a zoonotic disease caused by the gram-negative coccobacillus *Francisella tularensis*.

Routes of Exposure: Tularemia can be acquired by humans by inoculation of the skin or mucous membranes with blood or tissue from infected animals, or bites of infected deerflies, mosquitoes, or ticks. Less commonly, inhalation of contaminated dust or ingestion of contaminated foods or water can also cause human disease. The animal reservoirs of disease include rabbits, muskrats, and squirrels.

Infective Dose & Infectivity: 10-50 organisms

Incubation Period: The incubation period ranges from 1 to 14 days with an average of 3 to 5 days.

Clinical Effects: Different clinical forms of disease are seen depending on the route of exposure. Disease resulting from intentional aerosol release of *F. tularensis* would primarily cause typhoidal tularemia. Gastrointestinal symptoms such as diarrhea and pain may also be present. Typhoidal tularemia manifests with fever, prostration, weight loss, but with no adenopathy. Pneumonia is most common with the typhoidal form. Tularemia pneumonia is generally a severe atypical pneumonia that may be fulminating and can result from either inhalation of infectious aerosols or from aspiration of organisms from the pharynx. Tularemia pneumonia can also be secondary to a tularemia bacteremia. Tularemia pneumonia generally manifests with fever, headache, substernal discomfort, and non-productive cough. Radiographic evidence of pneumonia or mediastinal lymphadenopathy may or may not be present. Oculoglandular tularemia can result from inoculation of the conjunctivae with hand or fingers contaminated by tissue and/or fluids from an infected animal. The gastrointestinal form of tularemia manifests as abdominal pain, nausea, vomiting and diarrhea.

Lethality: The mortality rate without treatment is 33%. However, with appropriate treatment, the mortality rate is less than 2%.

Transmissibility: There is no known person-to-person transmission.

Primary contaminations & Methods of Dissemination: Tularemia would most likely be delivered via aerosolization, or sabotage of food and/or water.

Secondary Contamination & Persistence of organism: Secondary transmission is not an issue. However, *F. tularensis* can persist in cold, moist environments for extended periods.

Decontamination & Isolation:

Patients – Standard precautions should be practiced. Contact precautions should be used with skin lesions and secretions. Patients with direct exposure to aerosols, as well as their clothing, should be washed with soap and water.

Equipment, clothing & other objects – Heat, 0.5% hypochlorite solution (one part household bleach and 9 parts water = 0.5% solution) will kill the organisms and can be used for environmental decontamination.

Outbreak control: Following an intentional release, the risk of acquiring infection from local animals is minimal. The risk can be further minimized by educating the public in avoidance of sick animals as well as personal protective measures against bites from mosquitoes, deerflies, or ticks. Standard levels of chlorine in municipal water sources should protect against waterborne infection. In warm, arid environments, organisms in the soil are unlikely to survive for significant periods of time and are unlikely to present a hazard.

Laboratory testing: Serology is the most common diagnostic test; acute and convalescent serology is the most helpful. Identification of organisms by gram staining ulcer fluids or sputum is generally not helpful. Rapid testing of secretions, exudates and biopsies can be done by direct fluorescent antibody or PCR. Routine culture is difficult due to unusual growth requirements and/or overgrowth of commensal bacteria. Culturing is difficult and potentially dangerous. If tularemia is suspected, and cultures are obtained, the laboratory should be notified because of the high risk to laboratory workers due to transmissibility of the bacteria. *F. tularensis* can be grown from wounds, tissues, blood, and respiratory secretions.

Therapeutic Treatment: The recommended treatment for tularemia in a contained casualty setting is streptomycin or gentamicin*. Alternate choices include doxycycline, ciprofloxacin*, or chloramphenicol*. In a mass casualty setting where patients cannot be managed individually, the recommended treatments are doxycycline or ciprofloxacin*.

Prophylactic Treatment: Exposed individuals can be treated prophylactically with doxycycline or ciprofloxacin*.

Differential Diagnosis: The differential diagnoses should include typhoidal syndromes such as *Salmonella*, rickettsia, malaria, and any atypical pneumonic process.

References:

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For more information call (602) 364-3289

* Gentamicin, Ciprofloxacin, and Chloramphenicol do not have an FDA approved indication for tularemia

Frequently Asked Questions About Tularemia

What is tularemia?
Tularemia is an infectious disease caused by a hardy bacterium, *Francisella tularensis*, found in animals (especially rodents, rabbits, and hares).

How do people become infected with the tularemia bacteria?
Typically, persons become infected through the bites of arthropods (most commonly, ticks and deerflies) that have fed on an infected animal, by handling infected animal carcasses, by eating or drinking contaminated food or water, or by inhaling infected aerosols.

Does tularemia occur naturally in the United States and in Arizona?
Yes. It is a widespread disease of animals. Approximately 200 cases of tularemia in humans are reported annually in the United States, mostly in persons living in the south-central and western states. Tularemia in humans is relatively rare in Arizona. There were five cases reported in Arizona over the last ten years and 28 cases over the last twenty-five years. Nearly all cases occur in rural areas and are associated with the bites of infective ticks and biting flies or with the handling of infected rodents, rabbits, or hares. Occasional cases result from inhaling infectious aerosols and from laboratory accidents.

Why are we concerned about tularemia as a biological weapon?
Francisella tularensis is highly infectious: a small number of bacteria (10-50 organisms) can cause disease. If *F. tularensis* were used as a biological weapon, it would likely be spread through the air as an aerosol. Persons who inhale an infectious aerosol would generally experience severe respiratory illness, including life-threatening pneumonia and systemic disease, if they were not treated. The bacteria that cause tularemia occur widely in nature and could be isolated and grown in quantity in a laboratory, although manufacturing an effective aerosol weapon would require considerable sophistication.

Can someone become infected with the tularemia bacteria from another person?
No. Infected individuals have not been known to transmit the infection, so infected persons do not need to be isolated.

How quickly would someone become sick if they were exposed to the tularemia bacteria?
The incubation period for tularemia is typically 3 to 5 days, with a range of 1 to 14 days.

What are the signs and symptoms of tularemia?
Depending on the route of exposure, the tularemia bacteria may cause skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, oral ulcers, or pneumonia. If the bacteria were inhaled, symptoms would include the abrupt onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness. Persons with pneumonia can develop chest pain, difficulty breathing, bloody sputum, and respiratory failure. Forty percent or more of persons with the lung and systemic forms of the disease may die if they are not treated with appropriate antibiotics.

What should someone do if they suspect they or others have been exposed to the tularemia bacteria?
Seek prompt medical attention. If a person has been exposed to *Francisella tularensis*, treatment with tetracycline antibiotics is often recommended.

Local and state health departments should be immediately notified so an investigation and control activities can begin quickly. If the exposure is thought to be due to criminal activity (bioterrorism), local and state health departments will notify CDC, the FBI, and other appropriate authorities.

How is tularemia diagnosed?
When tularemia is clinically suspected, the healthcare worker will collect specimens, such as blood or sputum, from the patient for testing in a diagnostic or reference laboratory. Laboratory test results for tularemia may be presumptive or confirmatory.

Sometimes presumptive (preliminary) identification may take only a few hours, but confirmatory testing will usually take longer.

Can tularemia be effectively treated with antibiotics?
Yes. After potential exposure or diagnosis, early treatment is recommended with an antibiotic from the tetracycline (such as doxycycline) or fluoroquinolone (such as ciprofloxacin) class. Other antibiotics such as streptomycin or gentamicin, are also effective, but can only be given intramuscularly or intravenously. Sensitivity testing of the tularemia bacterium can be done to determine which antibiotics would be most effective.

How long can *Francisella tularensis* exist in the environment?
Francisella tularensis can remain alive for weeks in water and soil.

Is there a vaccine available for tularemia?
A vaccine for tularemia is available for use in laboratory workers, but it is not licensed for general use.

For more information call (602) 364-3289