

## TYPHUS FEVER

(Squirrel-associated Epidemic Typhus, Louse-borne Typhus Fever, Murine Typhus)

### REPORTING INFORMATION

- **Class B:** Report by the end of the next business day in which the case or suspected case presents and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism:
  - [Ohio Confidential Reportable Disease form](#) (HEA 3334, rev. 1/09), [Positive Laboratory Findings for Reportable Disease form](#) (HEA 3333, rev. 8/05), the local public health department via the Ohio Disease Reporting System (ODRS), or telephone.
- Key fields for ODRS reporting include: date of illness onset, and the Travel History module.

### AGENTS

*Rickettsia prowazekii*: louse-borne and squirrel-associated typhus fever.

*Rickettsia typhi*: murine typhus.

### CASE DEFINITION

#### Clinical description

The onset of epidemic typhus is often sudden and can include fever, headache, chills and malaise. In approximately 50% of cases, a rash develops after 5 to 6 days. Small pink macules usually appear first on the upper trunk or axillae then spread to the entire body with the exception of the face, palms and soles. As the disease progresses, the rash usually becomes dark and maculopapular or, in severe cases, petechial and hemorrhagic. Splenomegaly, hypotension, nausea, vomiting and confusion may also be seen. The fever lasts approximately 2 weeks. The case-fatality rate increases with age and varies from 10% to 40% in the absence of specific treatment. Children and people with partial immunity can have a mild infection with no rash.

*R. prowazekii* infections can sometimes remain latent and recrudesce years later in the form of Brill–Zinsser disease. Recrudescent typhus is usually mild, with lower mortality rates. The symptoms of the zoonotic form resemble classic typhus but are almost always mild. The fever usually lasts for 7 to 10 days and the rash is often barely visible or absent. Deaths are not seen with this form.

#### Laboratory Criteria for Diagnosis

Infections can be confirmed by serologic testing, PCR, or culture.

#### Case Classification

The Centers for Disease Control and Prevention (CDC) has not published a case definition for typhus fever. The following is used in Ohio.

Confirmed: A confirmed case of typhus has a compatible clinical history with a four-fold or greater change in IFA or CF antibody titer for *R. prowazekii* or *R. typhi*. Acute and convalescent sera should be run at the same laboratory at the same time.

#### Comment

Typhus is not a nationally reportable disease, so data are minimal.

## **SIGNS AND SYMPTOMS**

In squirrel-associated epidemic typhus, there is usually a sudden onset of headache, fever, myalgia and centrifugal exanths (the rash starts on trunk and spreads outward to extremities, whereas RMSF has a centripetal rash). The rash, reported from 61% of cases, is not a consistent feature of squirrel typhus. This makes clinical recognition more difficult. Louse-borne typhus fever is nearly identical to squirrel-associated epidemic typhus, and murine typhus is clinically similar to mild louse-borne typhus.

## **DIAGNOSIS**

See case classification.

## **EPIDEMIOLOGY:**

### **Source**

Flying squirrels appear to be the vertebrate reservoir for squirrel-associated epidemic typhus. Seropositive rates for flying squirrels at five case sites were quite high (about 70%). The vector is thought to be an ectoparasite of flying squirrels, probably a louse or flea. Rats are the natural reservoirs for murine typhus, but opossums and domestic cats may also be involved in transmission. The vector for murine typhus is the flea.

### **Occurrence**

Since Typhus Fever is not nationally reportable, accurate case statistics are not available. Two cases from Ohio (Butler County and Lucas County) were reported, one in 2006 and one in 2009. Onset typically occurs in winter, from December through February; occurring where people live under unhygienic conditions and are infested with lice.

### **Mode of Transmission**

As flying squirrels frequently congregate in attics for the winter, it has been suggested that the mode of transmission to humans may be via the bite of an ectoparasite, such as the squirrel louse or flea or through airborne transmission of excretions (squirrel or ectoparasite). Murine typhus is transmitted through the bite of infected rat fleas.

### **Period of Communicability**

Information is not known for squirrel-borne typhus. In louse-borne typhus (same pathogen), the body louse is infective for humans during the febrile period and possibly for an additional three days.

### **Incubation Period**

From 7-14 days, commonly 12 days.

### Note

Epidemic louse-borne typhus is transmitted by body lice and still exists in mountainous regions of Mexico, Central and South America, Africa and Asia. Approximately 90% of reported cases to the World Health Organization (WHO) are from Ethiopia. The last known case in an American tourist was in 1950. There is no vaccine. Brill-Zinsser disease is recrudescence of typhus fever.

Murine typhus, caused by *R. typhi*, is transmitted by rat fleas. It occurs worldwide. Texas reports the most cases in the United States.

## **PUBLIC HEALTH MANAGEMENT**

### **Case**

#### Investigation

A complete travel history for the patient for the three weeks prior to onset is necessary. Details are needed on squirrel infestation in buildings, patient contact with wildlife, fleas, lice and other biting arthropods.

#### Treatment

Doxycycline is the treatment of choice. Fluoroquinolones or chloramphenicol are alternative drugs for therapy. Antibiotic therapy should be initiated when this disease is suspected without waiting for test results.

#### Isolation and Follow-up Specimens

Section 3701-3-13, (CC), of the Ohio Administrative Code states:

"Typhus: a louse infested person with typhus shall be isolated until twenty-four hours after application of an effective pediculicide for body lice and clothing and environment are free of body lice."

A convalescent serum sample 2 or more weeks after onset is required to confirm infection.

### **Contacts**

No prophylaxis or isolation of contacts is indicated.

### **Prevention and Control**

Avoid close association with rodents, especially rats and flying squirrels. The key to recognizing squirrel typhus is winter onset of rickettsial disease, possibly suggesting RMSF. A history of squirrel contact may be elicited from the patient.

**What is typhus fever?**

Typhus fever is caused by one of two types of rickettsial bacteria. The bacteria are typically transmitted to humans by fleas or lice.

Typhus can be found in the cool mountainous regions of Africa, Asia, and Central and South America. Most cases of typhus fever in the United States are found in the eastern states.

**Who can get typhus fever?**

Anyone who comes into contact with infected parasites can get typhus fever. Outbreaks occur in situations where people are forced to live in crowded unhygienic surroundings which support the presence of human body lice and/or rats. Those living or working in close association with flying squirrels are also more likely to contract the disease.

**How is typhus fever transmitted?**

Epidemic louse-borne or squirrel-associated typhus is caused by *R. prowazekii* which can be transmitted by human body lice and lice or fleas associated with squirrels. Murine or endemic flea-borne typhus is caused by *R. typhi* which can be transmitted by rat fleas.

The bacteria can be found in the parasite (flea, louse) and in their feces which is often deposited near a bite wound. Infection usually occurs when a bite is scratched, introducing the bacteria into the wound. Bacteria remain infective in dried feces and dead parasites, so infection may also be contracted by inhaling the bacteria in dust from contaminated environments.

Typhus is not directly contagious, however lice can transmit the disease from person to person.

**What are the symptoms of typhus fever?**

With squirrel-associated typhus there is usually a sudden onset of headache, fever, general pains, and a rash that starts on the trunk spreading outward to the extremities. Without treatment, fatalities range from 10% to 40%. Murine typhus has similar but milder signs, with relatively few deaths.

**How long after exposure before symptoms appear?**

Signs of illness typically develop in one to two weeks.

**Can typhus fever be treated?**

Several antibiotics are effective in treating typhus fever.

**How can I prevent typhus fever?**

- Avoid sharing living space with rodents or flying squirrels.
- Use good sanitation and public health measures to reduce the rat population.
- Use insecticides in areas frequented by rodents or squirrels before cleaning.

**For more information please visit the following websites:**

MedLine <http://www.nlm.nih.gov/medlineplus/ency/article/001363.htm>

CDC Typhus Fever <http://wwwnc.cdc.gov/travel/yellowbook/2010/chapter-5/rickettsial-and-related-infections.htm>