

EASTERN EQUINE ENCEPHALITIS

(Eastern equine encephalomyelitis, EEE)

REPORTING INFORMATION

- Class A(2)
- Report by the end of the next business day
- [Confidential Case Report Card](#) (3812.11, rev. 12/81), [lab report](#) (3833.11), or telephone
- The [Mosquito-borne Encephalitis Investigation Worksheet](#) (ENC 15) is for local health department use in epidemiological case reporting. The completed form should be sent to the Vectorborne Disease Program, 900 Freeway Drive North, Columbus, OH 43229.

AGENT

Eastern Equine Encephalitis (EEE) virus is an RNA virus belonging to the genus *Alphavirus* (formerly group A of the arboviruses) of the family *Togaviridae*.

Infectious dose: A single bite of an infectious mosquito

CASE DEFINITION

Clinical description

Eastern equine viral infection can produce a febrile illness of variable severity associated with neurologic symptoms ranging from headache to aseptic meningitis or encephalitis. Arboviral encephalitis cannot be distinguished clinically from other central nervous system (CNS) infections. Symptoms can include headache, confusion or other alteration in sensorium, nausea, and vomiting. Signs may include fever, meningismus, cranial nerve palsies, paresis or paralysis, sensory deficits, altered reflexes, convulsions, abnormal movements, and coma of varying degree. [See also Aseptic Meningitis and Encephalitis, Primary, earlier in this section.]

Laboratory criteria for diagnosis

- Fourfold or greater change in [immunoglobulin M (IgM) or immunoglobulin G (IgG)] serum antibody titer [between acute and convalescent serum samples spaced ≥ 2 weeks apart], or
- Isolation of virus from or demonstration of viral antigen or genomic sequences in tissue, blood, cerebrospinal fluid (CSF), or other body fluid, or
- Specific IgM antibody by enzyme immunoassay (EIA) antibody captured in CSF or serum. Serum IgM antibodies alone should be confirmed by demonstration of IgG antibodies by another serologic assay (e.g., neutralization or hemagglutination inhibition).

Case classification

Probable: A clinically compatible case occurring during a period when arboviral transmission is likely, and with the following supportive serology: a stable (≤ 2 -fold change) elevated antibody titer to St. Louis encephalitis virus (e.g., ≥ 320 by hemagglutination inhibition, ≥ 128 by complement fixation, ≥ 256 by immunofluorescence, ≥ 160 by neutralization; or ≥ 400 by enzyme immunoassay IgM)

Confirmed: A clinically compatible case that is laboratory confirmed.

Comment

The seasonality of EEE is predictable. In Ohio, cases can occur from May to October, when the specific vector mosquito is active.

SIGNS AND SYMPTOMS

Onset is sudden, with fever, headache, conjunctivitis, vomiting and lethargy. The disease may progress rapidly to delirium and coma. Neurologic signs consist primarily of neck stiffness, convulsions, spasticity of muscles of the extremities and altered reflexes.

A biphasic course is common in children, beginning with fever, vomiting and headache for 1 to 2 days, followed by apparent recovery, and ending with fulminant encephalitis.

DIAGNOSIS

The following tests are available at ODHL:

- ELISA (Enzyme linked immunosorbent assay) will be run on paired acute and convalescent sera, or a single convalescent serum sample. ODHL does not charge for arboviral serologies.
- Viral assay of brain tissue on fatal cases.

EPIDEMIOLOGY

Source

EEE is a virus circulated between birds and certain mosquito species, especially in marshy areas. Horses, humans, pheasants, emus and other animals are accidental, dead-end hosts and are not usually a source of infection to humans.

Occurrence

EEE is the rarest of the mosquito-borne arboviral infections. A median of five sporadically occurring infections in humans are reported annually in the United States; however, the illness is fatal in at least 30% of cases and even higher case fatality rates are observed at the extremes of age. There are no records of human cases acquired in Ohio. Ohio's first recorded outbreak of EEE occurred in 1991 in Wayne and Holmes counties where 19 confirmed cases in horses were documented.

Mode of Transmission

The reservoir of EEE is wild birds, and the virus is transmitted by certain mosquito species. In the upper Midwest, EEE is transmitted by two marsh-breeding mosquitoes, *Culiseta melanura* and *Coquillettidia perturbans*. *C. melanura* is the primary enzootic vector and is a rare mosquito in Ohio. *C. perturbans* is a "bridge" vector and can be abundant in marshy areas. *C. perturbans* is believed to be the epidemic vector in Ohio, responsible for transmitting the virus to humans and equines.

Period of Communicability

Humans are dead-end hosts for the virus, i.e., they do not circulate sufficient numbers of the EEE virus in the blood stream to infect a mosquito, and the disease cannot be spread from person to person.

Incubation Period

The incubation period is 7 to 10 days.

PUBLIC HEALTH MANAGEMENT

Case

Investigation

With serologic identification of EEE infection, a complete travel history for the three weeks prior to onset is obtained. Exposure sites can be evaluated for mosquito vectors by standard mosquito collection techniques (light traps, larval samples). Mosquitoes collected should be immediately placed on dry ice in sealed, air-tight tubes and sent to the Vector-borne Disease Program (VBDP), for arboviral assay. The geographical extent of EEE activity can be estimated by a timely avian serosurvey.

Treatment

There is no specific therapy for EEE. Supportive care is indicated.

Isolation

Since the diagnosis is usually not known until after patient discharge, enteroviral precautions (i.e., fecal, respiratory) are usually indicated for encephalitis.

Follow-up Specimens

Not required for serologically diagnosed cases.

Public Health Significance

High. Because of the virulence of EEE virus, the prognosis is poor, with a high chance for fatality or severe neurologic sequelae. Report of a single case may signify an outbreak is developing. An outbreak in horses occurred in Wayne and Holmes counties for the first time in 1991.

Special Information

Specific diagnosis is critical to prevention.

Contacts

No treatment or prophylaxis of contacts is indicated.

Prevention and Control

Vaccination

There is no approved vaccine for the general public. An experimental vaccine is available for researchers who are working with the virus in the laboratory. There is a vaccine for horses only, but vaccination of horses will not prevent the spread of EEE to people.

Vector Investigation

With the report of a human or equine case of EEE, a vector assessment should be done to determine if an outbreak is developing. Mosquito and bird blood samples can be tested for EEE by the VBDP. For advice on vector assessment, contact the VBDP at 614/752-1029 or via the ODH website (www.odh.state.oh.us).

Special Information

The risk of exposure to EEE virus is primarily in areas where a combination of acid bogs and cattail marshes exist. These are the breeding sites for the enzootic and epizootic vectors. Outbreaks are more likely in rural and suburban areas.