



# Encephalitis Disease - Excludes disease caused by otherwise reportable conditions

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## Disease Plan

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Last updated: December 20, 2019, by Dallin Peterson.

Questions about this disease plan?

Contact the Utah Department of Health, Bureau of Epidemiology at 801-538-6191.



## CRITICAL CLINICIAN INFORMATION

| Clinical Evidence   |
|---|
| <p>Signs/Symptoms</p> <ul style="list-style-type: none"> <li>• Fever</li> <li>• Headache</li> <li>• Lethargy</li> <li>• Confusion</li> <li>• Seizures</li> <li>• Alterations in consciousness</li> </ul>  |
| <p>Period of Communicability</p> <ul style="list-style-type: none"> <li>• Varies by etiologic agent</li> </ul>  |
| <p>Incubation Period</p> <ul style="list-style-type: none"> <li>• Varies by etiologic agent</li> </ul>  |
| <p>Mode of Transmission</p> <ul style="list-style-type: none"> <li>• Enteroviruses: spread person to person through droplet or feces</li> <li>• <i>Listeria</i> and <i>T. gondii</i>: acquired through contaminated food</li> <li>• Measles/varicella/herpes virus: droplet</li> <li>• Arboviruses: spread through the bite of vectors such as mosquitos and ticks</li> <li>• Rabies virus: bite from an infected animal</li> </ul> |
| Laboratory Testing  |
| <p>There is no laboratory test specific for encephalitis. It is a clinical diagnosis.</p>   |
| Treatment Recommendations   |
| <p>Treatment depends on the etiologic agent causing the illness.</p>  |
| Contact Management  |
| <p>Isolation of Case</p> <ul style="list-style-type: none"> <li>• As appropriate by disease</li> </ul>  |
| <p>Quarantine of Contacts</p> <ul style="list-style-type: none"> <li>• As appropriate by disease</li> </ul>   |
| Infection Control Procedures  |
| <ul style="list-style-type: none"> <li>• As appropriate by disease</li> </ul>   |

## ✓ WHY IS ENCEPHALITIS IMPORTANT TO PUBLIC HEALTH?

Encephalitis is inflammation of the brain. Although there are several causes of encephalitis, the most common is from viral infections, and in many cases, the etiology is never confirmed. Reporting encephalitis cases can assist local, state, and national authorities to recognize outbreaks of rare etiologies and to enforce control measures to limit future infections.

## ✓ DISEASE AND EPIDEMIOLOGY

### Clinical Description

Encephalitis is an inflammation of the brain. Symptoms vary depending on the etiologic agent and include alterations of consciousness, fever, headache, lethargy, confusion, and seizures. Since encephalitis can coexist with inflammation of the meninges, symptoms of meningitis (e.g., fever and stiff neck) may also be present.

### Causative Agent

Infectious agents that can cause encephalitis include bacteria, viruses, fungi, protozoans, and other parasites. Viral causes of encephalitis include herpes viruses, enteroviruses, mumps, measles, and varicella viruses; nonviral causes include bacteria such as *Listeria* and *Leptospira*, fungi such as *Histoplasma capsulatum* and *Cryptococcus neoformans*, protozoa such as *Toxoplasma gondii*, and metazoan parasites such as *Gnathostoma* sp. and *Taenia solium*. Encephalitis, which is not truly infectious, can follow certain infections (e.g., measles and mumps), and can occur as an immune-mediated disease. It rarely occurs as a result of vaccination.

- **Primary encephalitis** occurs when a virus or other agent directly infects the brain. The infection may be concentrated in one area or widespread.
- **Secondary or Post-infectious encephalitis** is also known as acute disseminated encephalomyelitis. This condition results from an immune system reaction to an infection elsewhere in the body. Instead of only attacking the cells causing the infection, the immune system also mistakenly attacks healthy cells in the brain. This often occurs one to three weeks after the initial infection.
- **Unspecified encephalitis** describes the situation where the cause of the encephalitis is unknown.

### Differential Diagnosis

There is a broad range of causes of encephalitis. Only some causes are infections and not all infections are viral. Many noninfectious causes of encephalitis may be tumors, adverse effects of medications, and other autoimmune diseases.

## Laboratory identification

There is no laboratory test specific for encephalitis. It is a clinical diagnosis.

## Treatment

Treatment depends upon the etiologic agent causing the illness.

## Case fatality

Case fatality depends upon the etiologic agent. Individuals at the extremes of age are at highest risk.

## Reservoir

The Reservoir also depends on etiology. It may be arboviral, zoonotic, bacterial, viral, fungal, environmental, etc. Humans are the reservoir for enteroviruses and for mumps, measles, herpes simplex, and varicella viruses. *H. capsulatum* and *C. neoformans* are organisms found in soil, especially soil contaminated with bird droppings. Cats (and members of the cat family) are the definitive host for *T. gondii*; they acquire the parasite from eating infected rodents or other infected meat. Monkeys are the reservoir for simian B virus (cercopithecine herpesvirus 1).

## Transmission

Enteroviruses are transmitted person to person through ingestion of material contaminated by the feces of an infected person or through exposure to infectious respiratory droplets. They may also be transmitted indirectly via fomites. Some causes of encephalitis, such as *Listeria* sp. and *T. gondii*, may be acquired through consumption of contaminated food. Measles and varicella viruses are transmitted person to person through the airborne route. Simian B disease is transmitted to humans through monkey bites or exposure of naked skin or mucous membranes to infectious monkey saliva or monkey tissue culture.

## Susceptibility

Everyone not previously infected is susceptible. Those on the extreme end of age and those with weakened immune systems are at highest risk.

## Incubation period

For most enteroviruses, the incubation period ranges from 3–6 days. For herpes simplex, it is 2–12 days; 3 days–3 weeks for simian B disease; and 2–17 days for histoplasmosis. Incubation periods for some of the other agents that can cause encephalitis (e.g., arboviruses, measles, mumps, or varicella) are found in their respective disease specific plan.

## **Period of communicability**

The period of communicability varies by etiologic agent, and some of them are not transmitted person to person (e.g., histoplasmosis and toxoplasmosis). Enteroviruses may be shed in feces for several days to many weeks after symptoms have resolved. Enteroviruses may also be shed in respiratory secretions, usually for no longer than one week following symptoms.

## **Epidemiology**

Most of the etiologic agents that cause encephalitis are found in most parts of the world. Cases occur sporadically throughout the year, and enteroviral infections peak in the late summer and early fall in temperate zones.

In the United States, several thousand cases of viral encephalitis are reported yearly to the CDC. This is likely a fraction of the actual number of cases due to under reporting of encephalitis cases to public health. The most common causes of viral encephalitis in the United States are the herpes simplex virus (HSV) and varicella-zoster virus (VZV). Arboviruses are the most common causes of episodic encephalitis with reported incidence similar to that of HSV. However, these statistics may be misleading because most people bitten by arbovirus-infected insects do not develop clinical disease, and only 10% develop overt encephalitis.

West Nile Virus is the most common cause of arboviral encephalitis in Utah and the United States. Other common arboviruses that occur in the U.S. include St Louis encephalitis, found throughout the United States but principally in urban areas around the Mississippi River, and the geographically misnamed California virus (in particular, the strain that causes LaCross encephalitis [LAC]), which affects children in rural areas in states of the northern Midwest and East. Among the other arboviruses causing encephalitis, the deadliest and, fortunately, most uncommon, eastern equine encephalitis (EEE), is encountered in New England and surrounding areas; the milder western equine encephalitis (WEE) is most common in rural communities west of the Mississippi River. Powassan virus is the only well-documented arbovirus transmitted by ticks in the United States. More information about encephalitis related to arboviruses is found in the Arbovirus Disease Plan.

Measles produces two devastating forms of infection: acute encephalitis, which occurs in about 0.1% of infected persons, and subacute sclerosing panencephalitis (SSPE), an extremely rare degenerative central nervous disease. Since measles was eliminated in the United States in 2000, SSPE is rarely reported in the United States. Typically, 0–3 unrelated cases of rabies encephalitis are identified yearly. See the Measles and Rabies Disease Plans for more information.

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## ✓ PUBLIC HEALTH CONTROL MEASURES

### Public health responsibility

- Investigate all suspect cases of disease, fill out and submit appropriate disease investigation forms.
- Identify clusters or outbreaks of this disease.
- Identify possible emerging sources of disease.
- Identify sources of exposure and stop further transmission.

### Prevention

Due to the wide variety of etiologic agents that can cause encephalitis and the differing modes of transmission, there is no single set of preventive measures to avoid infectious non-arboviral encephalitis. However, enteroviral and many other types of non-arboviral encephalitis may be prevented by enforcing measures that can prevent primary infection with the etiologic agent.

#### Recommendations

- Always wash hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, after wiping or blowing noses, and after contact with any nose, throat, or eye secretions.
- Wash own hands as well as the child's hands after changing diapers, and dispose of the diapers in a sanitary manner.
- Dispose of towels or tissues contaminated with nose, throat, or eye fluids in a sanitary manner.
- If caring for someone with diarrhea, scrub hands with plenty of soap and water after cleaning the bathroom, after helping the person use the toilet, or after changing diapers, soiled clothes, or soiled sheets.
- Keep current on all recommended immunizations.

### Chemoprophylaxis

As appropriate by disease.

### Vaccine

As appropriate by disease.

### Isolation and quarantine requirements

**Isolation:** As appropriate by disease.

**Hospital:** As appropriate by disease.

**Quarantine:** As appropriate by disease.

## ✓ CASE INVESTIGATION

### Reporting

See case definitions below for reporting requirements.

### Case definition

There is no CDC case definition specific to encephalitis. If encephalitis is caused by an otherwise reportable illness, report the case of encephalitis by that specific disease. Only report cases of encephalitis due to diseases that are not otherwise a reportable condition.

#### Confirmed

A confirmed case has a clinical diagnosis of encephalitis plus a laboratory confirmation of a causative infectious agent (specify).

#### Probable

A probable case has a clinical diagnosis of encephalitis, without any otherwise identifiable attributable cause.

### Case Investigation Process

- Fill out a morbidity form and record encephalitis as the disease being reported.
- Indicate the bacterial, viral, or other organism isolated/identified and assure that it is not due to an otherwise reportable disease. If it is due to another reportable illness (e.g., arbovirus), record the reportable illness as the disease being reported.
- Fill out the appropriate investigation form.
- If the number of reported cases of non-arboviral encephalitis in a particular jurisdiction or institution is higher than usual or if an outbreak is suspected, investigate clustered cases to determine the source of infection and the mode of transmission. A common vehicle and mode of transmission should be sought, and applicable preventive or control measures should be instituted. Additionally, identification of common risk factors (e.g., age, school, workplace, or activities) may lead to the institution of effective prevention and control measures. Consult with the epidemiologist on-call at the UDOH Bureau of Epidemiology at (801) 538-6191 or (888) 374-8824. The Bureau can help determine a course of action to prevent further cases and can perform surveillance for cases across jurisdictions.

### Outbreaks

See specific diseases for more information. For illness not caused by an otherwise reportable disease, an outbreak is defined as more than two standard deviations above the expected value for a single causative agent.

### Identification of case contacts and management

As appropriate by disease.

## ✓ REFERENCES

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## ✓ VERSION CONTROL

12/20/2019: Updated disease plan with critical clinician information. Clarified reporting requirements.