

ENCEPHALITIS

Excludes disease caused by otherwise reportable conditions

✓ 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** describes the situation where the cause of the encephalitis is known and is believed to be responsible for the patient's symptoms.
- **Post-infectious encephalitis** is also known as acute disseminated encephalomyelitis. This describes a situation where the patient has recovered recently from an illness, and develops encephalitis at a subsequent date.
- **Unspecified encephalitis** describes the situation where the cause of the encephalitis is unknown.

Differential Diagnosis:

Text

Laboratory identification:

There is no laboratory test that is specific for encephalitis – it is a clinical diagnosis.

Treatment:

Treatment would depend upon the etiologic agent causing the illness.

Case fatality:

Depends on etiologic agent. Individuals at the extremes of age are at highest risk

Reservoir:

Depends on etiology; could 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 from 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 from 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 are at higher 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., measles, mumps, or varicella) can be 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 from 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 probably a fraction of the actual number of cases.

Herpes simplex virus (HSV), the most common cause of sporadic encephalitis in Western countries, is relatively rare; the overall incidence is 0.2 per 100,000 (neonatal HSV infection occurs in 2-3 per 10,000 live births).

Arboviruses are the most common causes of episodic encephalitis with reported incidence similar to that of HSV. These statistics may be even more misleading because most people bitten by arbovirus-infected insects do not develop clinical disease, and only 10% develop overt encephalitis.

The 2 most common arboviruses result in (1) St Louis encephalitis, found throughout the United States but principally in urban areas around the Mississippi River, and (2) 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.

Among less common causes of viral encephalitis, varicella-zoster encephalitis has an incidence of 1 in 2000 infected persons. Measles produces 2 devastating forms of encephalitis: postinfectious, which occurs in about 1 in 1000 infected persons, and SSPE, occurring in about 1 in 100,000 infected patients. Typically, 0-3 unrelated cases of rabies encephalitis are identified yearly.

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PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and 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.

Recommend that individuals:

- Always wash their 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:

Text

Case definition:

There is no CDC case definition for encephalitis. If the disease is caused by an otherwise reportable illness, report the case there. Only report cases of encephalitis due to diseases that are not otherwise reportable in this category.

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) then record arbovirus as the disease being reported.
- Fill out the investigation form.
- If the number of reported cases of non-arboviral encephalitis in your city/town is higher than usual or if you suspect an outbreak, investigate cases clustered in an area or institution 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 town lines, which would otherwise be difficult to identify at the local level.

Outbreaks:

See specific diseases for more information. For illness not caused by an otherwise reportable disease, an outbreak will be defined as more than 2 standard deviations above the expected value for a single causative agent.

Identification of case contacts and management:

As appropriate by disease.

REFERENCES

Centers for Disease Control, Case Definitions for Infectious Conditions Under Public Health Surveillance. MMWR 46 (RR-10), 1997.1

Massachusetts Department of Public Health, Guide to Surveillance, Reporting and Control, 2006.

American Academy of Pediatrics. Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition*. Elk Grove Village, IL, American Academy of Pediatrics, 2003.

Emedicine: <http://www.emedicine.com/emerg/topic163.htm>

Marjorie Lazoff, MD, Medical Editor, Medical Computing Today; Contributing Editor, MSR's NetView

Heymann, D., ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington DC, American Public Health Association, 2004.

Mandell, G., Bennett, J., Dolin, R., eds. *Principles and Practice of Infectious Diseases, 5th Edition*. New York, John Wiley and Sons, 2000.

MDPH. Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements. MDPH, Promulgated November 4, 2005.