LOUISIANA DEPARTMENT OF HEALTH
Public Health

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VIRAL (ASEPTIC) MENINGITIS

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Aseptic meningitis is a central nervous system infection characterized by fever and meningeal symptoms with moderate, predominantly lymphocytic CSF pleocytosis and the absence of bacterial or fungal pathogens in CSF. The disease occurs both sporadically and in outbreaks; more than 90% of cases with an identified cause are associated with enteroviruses.

Epidemiology

Aseptic or viral meningitis is the most common type of meningitis and is associated with an estimated 500 to 800 hospitalizations each year in Louisiana.

Enteroviruses typically are spread person-to-person through the fecal-oral or oral-oral routes and through respiratory droplets and fomites. Enteroviruses typically demonstrate a marked seasonality in temperate climates, with a typical enterovirus season occurring during June to October. Enteroviruses represent 85% to 95% of all cases in which a pathogen is identified. The majority (80%) of enteroviruses causing viral meningitis in Louisiana include only 15 enteroviral serotypes: echovirus 11; echovirus 9; coxsackievirus B5; echoviruses 30, 4 and 6; coxsackieviruses B2, B4, B3 and A9; echoviruses 3, 7, 5 and 21; and coxsackievirus B1. More than one episode of enteroviral meningitis may develop, although the same enteroviral serotype has not been implicated more than once in any immunocompetent patient.

Arboviral meningitis: West Nile Virus (WNV) has the same seasonal pattern as enteroviruses and is also associated with neurologic signs and symptoms of aseptic meningitis. However, WNV-associated meningitis tends to occur among older persons (median age: 46 years), whereas children and young adults (median age: 13 years) are at highest risk for enteroviral meningitis. The investigation of an aseptic meningitis outbreak in an area of high WNV epizootic activity in 2001 indicated that enteroviruses were the leading cause of aseptic meningitis in this area; no evidence of WNV infection was detected. For this reason, diagnostic testing of specimens from younger patients with aseptic meningitis should include testing for enteroviruses, even during a documented WNV outbreak.

Mumps: In a pre-vaccinated population, mumps is one of the most common causes of aseptic meningitis and encephalitis; symptomatic meningitis is estimated to occur in 10% to 30% of mumps patients overall. With universal immunization, mumps is currently a rare cause of aseptic meningitis.

Lymphocytic choriomeningitis (LCM) virus is rarely reported as an etiologic agent. LCM is transmitted to humans by contact with rodents (e.g., hamsters, rats, mice) or their excreta; the greatest risk of infection is in laboratory workers, pet owners and persons living in impoverished and non-hygienic situations.

Herpesviruses include herpes simplex virus (HSV) types 1 and 2; varicella-zoster virus (VZV); cytomegalovirus (CMV); Epstein-Barr virus (EBV); and human herpesviruses (HHV) 6, 7 and 8. Meningitis is usually associated with herpes simplex viruses. Overall, HSV accounts for approximately 0.5% to 3% of all cases of aseptic meningitis. HSV aseptic meningitis is most commonly associated with primary genital infection with HSV type 2. Acute aseptic meningitis has also been associated with VZV in patients with or without typical skin lesions. Cases of Mollaret's recurrent meningitis have been associated with HSV type 1, HSV type 2 and EBV. HHV 6 has also been associated with meningitis in

conjunction with *roseola infantum*. CMV and EBV may cause aseptic meningitis in association with a mononucleosis syndrome, particularly in an immunocompromised host.

Lyme disease: It is estimated that 10% to15% of untreated Lyme Disease cases result in some form of nervous system involvement. During Lyme season in areas with high incidence of the disease, it is suspected that Lyme may be a causative agent in 20% to50% of cases of lymphocytic meningitis.

The incubation period for influenza is one to four days, with an average of two days for enteroviral meningitis. It is different for other viral meningitis.

Clinical Description

The illness is characterized by sudden onset of fever with signs and symptoms of meningeal involvement, with changes in CSF including increased protein, increased lymphocytes count, normal sugar and absence of bacteria.

Complications, mortality: Aseptic meningitis is a benign, self-limiting illness; severe illness and death are uncommon.

The treatment is symptomatic and the majority of patients recover in approximately one week.

Laboratory Tests

A large variety of viral agents can cause neurological infections. Specific identification of the agent responsible is made in less than half of the cases. It is essential that specimens be collected at the onset of disease. Prompt specimen collection is especially vital in the case of epidemics.

Viral agents may be isolated in early stages of disease from throat washings, stool, CSF or blood by tissue culture techniques or animal inoculation. Although virus culture is the standard technique for enterovirus detection, it consumes time and resources and has limited clinical use.

Molecular methods of enterovirus detection (PCR and typing based on genomic sequences) are available. Serotype-specific PCR primers have been developed. These serotype-specific primers are useful for rapid differentiation of cases in patients infected with the outbreak strain from sporadic infections with other enteroviruses. Contact the State Laboratory Virology Section at (504) 568-5374 or the Infectious Disease Epidemiology Section for more information or in the event of an outbreak.

CSF Values for Meningitis

CSF Fluid Test	Normal Value	Bacterial Meningitis	Viral Meningitis	Fungal Meningitis	Tubercular Meningitis
Opening pressure	50-80 mmH20	Elevated	Typically normal (possible moderate increase)	Variable	Variable
Glucose (mg/dL)	40-85	<40 Normal to steep decrease)	>40 (Normal)	<40 (Low)	<40 (Low)
Protein (mg/dL)	15-45	>250 (Steep increase)	<100 (Moderate increase)	25-500 (Moderate to steep increase)	50-500 (Moderate to steep increase)
Leukocytes (WBC) (cells/dL)	0-5 (Adults/children); 0-30 (Newborns)	>500 (Typically >1000); <100 early on	<100	Usually <500 (range: 10-1000)	Usually <500 (range: 10-1000)
Culture	sterile	Positive (bacterial)	Negative	Positive (fungal)	Positive (AFB)
Cell differential	60-70% Lympho; ~30% Mono & macro; <2% Other cells	Predominantly neutrophilic (PMNs)	Neutrophils (early); Lympho (late)	Predominantly lympho	Predominantly lympho

Surveillance

Viral meningitis is a reportable condition in Louisiana. Reporting was mandatory except for the period 1995 to 2001. It was made reportable again in 2001 because of: 1) public concern about meningitis outbreaks; 2) concerns about case finding for arboviral encephalitis; and 3) concerns about identifying bioterrorism events.

Report and Confirm Early Cases

- Upon receipt of a report of a case of meningitis, contact the physician and/or hospital to verify the diagnosis. Determine whether the case has been identified as bacterial or viral.
- Rule out bacterial meningitis on the following criteria:
  - Viral meningitis pattern in the CSF: low cell count, normal glucose, moderately high protein
  - Absence of bacterial antigens in the CSF
  - Negative bacterial culture in the CSF
- Rule out bacterial meningitis partially treated with antibiotics
- Rule out arthropod-borne encephalitis by ascertaining the results of antibody tests in the CSF and serum
- Offer testing for enteroviruses in the CSF (see Laboratory section)

Case Definition

A case of aseptic meningitis is defined as a syndrome characterized by acute onset of meningeal symptoms, fever and cerebrospinal fluid pleocytosis, with no laboratory evidence of bacterial or fungal meningitis. The case definition is based on a clinical diagnosis.

Investigation

An investigation is warranted whenever an outbreak is suspected. The purpose of investigation is to differentiate the illness from bacterial meningitis and to try to identify the causative organism.

Prevention of transmission

Preventive measures depend upon the etiology. There is no specific treatment for the usual causative viral agents.

Adherence to good hygienic practices such as: frequent and thorough hand washing (especially after diaper changes); disinfection of contaminated surfaces by household cleaners (e.g., diluted bleach solution); and avoidance of shared utensils and drinking containers are recommended to help interrupt transmission.

Outbreaks of aseptic meningitis do cause serious concerns in an affected community. These concerns must be recognized and addressed in outbreaks occurring in day care centers, schools or any population group. Pamphlets explaining etiology, clinical presentation and management of the disease should be used to address these concerns.

Isolation: Contact precautions are indicated for seven (7) days after onset of illness unless a non-enteroviral diagnosis is established.