



# Meningitis – Viral (Aseptic Meningitis)

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*Note: This disease plan focuses only on meningitis caused by viruses, most likely Enteroviruses and Parechoviruses that are not covered by other disease plans such as arbovirus, WNV, dengue, etc., with the exception of Varicella-zoster virus. For information about bacterial meningitis, refer to the disease plans for Haemophilus influenzae, Streptococcus pneumoniae, Group A and B streptococcus, and Meningitis (Bacterial, other).*

## Disease Plan

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**Last updated: 07/09/2020, by Robyn Atkinson.**

**Questions about this disease plan?**

**Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.**

✓ **CRITICAL CLINICIAN INFORMATION**

**Note: For meningitis NOT caused by *Varicella-zoster virus*.**

<b>Clinical Evidence</b>
<p>Signs/Symptoms</p> <ul style="list-style-type: none"> <li>• Fever</li> <li>• Headache</li> <li>• Stiff neck</li> <li>• Photophobia</li> <li>• Lethargy</li> <li>• Nausea/Vomiting</li> <li>• Irritability</li> </ul>
<p>Period of Communicability</p> <ul style="list-style-type: none"> <li>• Primarily seen in late spring and fall</li> <li>• Enteroviruses can be shed in feces for several days to many weeks after symptoms have resolved.</li> <li>• Enteroviruses may also be shed in respiratory secretions, usually for no longer than one week following onset of symptoms.</li> </ul>
<p>Incubation Period</p> <ul style="list-style-type: none"> <li>• Variable. For most enteroviruses, it is 3-6 days.</li> <li>• Highest incidence in young infants and children younger than 5 years of age)</li> </ul>
<p>Mode of Transmission</p> <ul style="list-style-type: none"> <li>• Primarily from person to person, but varies depending on the particular virus and may include: <ul style="list-style-type: none"> <li>○ fecal-oral (enteroviruses),</li> <li>○ food or waterborne (enteroviruses),</li> <li>○ respiratory droplet (enteroviruses),</li> <li>○ surfaces (enteroviruses), or</li> <li>○ direct contact (herpes simplex).</li> </ul> </li> </ul>
<b>Laboratory Testing</b>
<p>Type of Lab Test/Timing of Specimen Collection</p> <ul style="list-style-type: none"> <li>• Lumbar puncture along with blood culture</li> <li>• CSF should be analyzed for: <ul style="list-style-type: none"> <li>○ Cell counts</li> <li>○ Presence of virus – by PCR or viral culture</li> <li>○ Gram stain and bacterial culture</li> </ul> </li> </ul>
<b>Treatment Recommendations</b>
<ul style="list-style-type: none"> <li>• Supportive care</li> <li>• Rest, hydration, antipyretics and pain or anti-inflammatory medications may be given as needed.</li> <li>• For severe cases, Intravenous (IV) antibiotics should be administered as soon as bacterial meningitis is suspected.</li> <li>• Patients with signs and symptoms of meningoencephalitis should receive empiric acyclovir early to possibly curtail HSV encephalitis</li> <li>• For newborns and infants, broad-spectrum antibacterial coverage and acyclovir should be instituted as soon as viral meningitis is suspected to reduce the chance of viral septic shock.</li> <li>• Usually resolves within 7-10 days.</li> </ul>
<b>Contact Management</b>
<p>Quarantine of Contacts</p> <ul style="list-style-type: none"> <li>• None</li> </ul>
<b>Infection Control Procedures</b>
<ul style="list-style-type: none"> <li>• Standard precautions</li> </ul>

## ✓ WHY IS VIRAL MENINGITIS IMPORTANT TO PUBLIC HEALTH?

Meningitis is an inflammation of the meninges or the tissue surrounding the brain and spinal cord. It is critical to determine the cause of meningitis as some forms of the disease are deadly and others will resolve on their own. Viral meningitis is often referred to as aseptic meningitis. The term aseptic meningitis refers to patients who have clinical and laboratory evidence for meningeal inflammation with negative routine bacterial cultures. Aseptic meningitis often has a similar presentation to that of bacterial meningitis (i.e., fever, headache, altered mental status, stiff neck, photophobia), which can be a life-threatening illness. Many patients with aseptic meningitis have a self-limited course that will resolve without specific therapy. However, it's very important for anyone with symptoms of meningitis to see a healthcare provider right away, because some types of meningitis can be very serious. Only a healthcare provider can determine if a person has the disease, the cause of the meningitis, and the best treatment. Infants younger than one month of age and individuals with weakened immune systems are at risk for severe illness.

April 24<sup>th</sup> is World Meningitis Day.

## ✓ DISEASE AND EPIDEMIOLOGY

### Clinical Description

Meningitis is an inflammation of the membranes covering the brain and the spinal cord. Due to the many causes of viral meningitis, the clinical description of disease can vary, but illness is generally characterized by fever, stiff neck, headache, nausea and vomiting, and (variably) rash. Meningitis caused by enteroviruses is relatively common, especially in children. Illness typically resolves within ten days, and most individuals have a complete recovery.

### Causative Agent

Viral meningitis can be caused by many different viruses. Coxsackievirus and echovirus, both members of the enterovirus group, are responsible for the majority of identified viral meningitis cases in the U.S. Adenovirus, mumps, measles, herpes simplex, varicella, and arboviruses can also cause meningitis. Enterovirus spreads most often in the late spring to fall, and only a small number of individuals who get infected with enterovirus will actually develop meningitis.

**NOTE:** This disease plan is devoted to the viral meningitis caused by agents that have not been allocated individual disease plans. Depending on the type of meningitis, you may need to refer to the disease plans pertaining to those agents, such as measles, mumps, varicella, West Nile virus (WNV) or eastern equine encephalitis virus (EEE) (Arbovirus disease plan).

### Differential Diagnosis

The differential diagnosis includes:

Infectious causes:

Brucellosis, HIV-1 associated CNS, *Haemophilus influenza*, HSV, Lyme disease, Neurocysticercosis, Neurosyphilis, Staphylococcal meningitis, Tuberculous meningitis, Shingles (*Varicella zoster*), Parameningeal infection, *Coccidioides immitis* infection, *Cryptococcus neoformans* infection, *Histoplasma capsulatum* infection, *Candida* species infection, *Blastomyces dermatitidis* infection, Mycoplasma infection, *Listeria* infection, *Leptospira* infection.

Other causes:

Acute disseminated encephalomyelitis, EEG in status epilepticus, hydrocephalus, leptomeningeal carcinomatosis, low-grade astrocytoma, migraine variants, neurosarcoidosis, subdural empyema, systemic lupus erythematosus, certain drugs, heavy metals, poisoning, and reaction to surgically implanted materials.

## Laboratory Identification

- Laboratory results that indicate no evidence of bacterial, parasitic, or fungal causes for infection (e.g., cultures are negative); or
- Laboratory results that indicate a specific viral cause (e.g., enterovirus).

**NOTE:** *High White Blood Cell (WBC) count in the cerebrospinal fluid (CSF) (especially neutrophils), high protein level, and low glucose level should suggest the diagnosis of bacterial meningitis, though some viral pathogens may present with similar CSF profiles.*

## Treatment

Treatment for viral meningitis is mostly supportive. Rest, hydration, antipyretics, and pain or anti-inflammatory medications may be given as needed. The most important decision in ill patients is whether to initiate antimicrobial therapy for possible bacterial meningitis pending clear identification of the cause of meningitis. Intravenous (IV) antibiotics should be administered in severe cases as soon as bacterial meningitis is suspected. Patients with signs and symptoms of meningoencephalitis should receive empiric acyclovir to possibly curtail HSV encephalitis. Therapy can be modified further as the results of Gram stain, cultures, and PCR testing become available.

Enteroviruses and HSV are both capable of causing viral septic shock in newborns and infants. In these young patients, as soon as the diagnosis is suspected, broad-spectrum antibacterial coverage and acyclovir should be instituted.

## Case Fatality

Most people who get viral meningitis completely recover on their own within 7 to 10 days, resulting in the mortality rate associated with viral meningitis being less than 1%; the morbidity rate is also low.

## Reservoir

Humans are the reservoir for enteroviruses, and herpes simplex viruses. Enteroviruses have also been found in water sources such as pools, lakes, etc. Humans are incidentally infected by arboviruses, with mosquitoes serving as vectors. Natural reservoirs for many arboviruses remain unknown, but they include birds, rodents, reptiles, amphibians, or other animals.

## **Transmission**

The viruses that cause meningitis are transmitted primarily from person-to-person. Person-to-person transmission varies, depending on the particular virus, and may include fecal-oral (enteroviruses), food or waterborne (enterovirus), respiratory droplet (enteroviruses), and direct contact (herpes simplex). Arboviruses are transmitted to humans by arthropod vectors, including mosquitoes, ticks, sand flies, and midges.

## **Susceptibility**

Everyone without prior infection is susceptible. For most viruses, infection confers immunity. However, some populations are at a higher risk of developing viral meningitis. These populations include children younger than five years of age and individuals with a weakened or compromised immune system.

## **Incubation Period**

The incubation period for viral meningitis is variable. For most enteroviruses, it is 3–6 days.

## **Period of Communicability**

Enteroviruses can 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 onset of symptoms.

## **Epidemiology**

Viral meningitis occurs worldwide, as epidemics and as sporadic cases. In the U.S., increases in cases of viral meningitis caused by enteroviruses are typically observed in the late summer and fall. Enteroviral meningitis is most common in young children. More than 10,000 cases are reported annually, but the actual incidence may be as high as 75,000. Lack of reporting is due to the uneventful clinical outcome of most cases and the inability of some viral agents to grow in culture.

# **PUBLIC HEALTH CONTROL MEASURES**

## **Public Health Responsibility**

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.

## **Prevention**

Since most forms of viral meningitis are caused by enteroviruses, which are shed in feces or respiratory secretions, individuals should be advised to practice good hygiene, especially frequent and thorough hand washing.

Advise individuals to:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, and after changing diapers.
- After changing diapers, wash the child's hands as well as their own hands, and dispose of feces in a sanitary manner.
- Wash their hands thoroughly and frequently when ill with diarrhea or when caring for someone with diarrhea. Hands should be scrubbed for at least 15–20 seconds after cleaning the bathroom; after using the toilet or helping someone use the toilet; after changing diapers, soiled clothing or soiled sheets; before handling food; and before eating.
- Vaccinate with appropriate vaccines. Vaccines can prevent certain serious infections.
- Avoid close contact such as kissing, hugging, or sharing cups or eating utensils with people who are sick.
- Clean and disinfect frequently touched surfaces, such as toys and doorknobs, especially if someone is sick.
- Stay home when sick.

## **Chemoprophylaxis**

There is no need for any medical treatment for people who have been in contact with a case of viral meningitis. The most effective way to prevent the spread of these viruses is through proper hand washing, good general hygiene, and following general sick precautions. This should be communicated to the school or childcare facility or anyone that has been in contact with a person who has viral meningitis. It should be noted that most people with enteroviral infections do not develop meningitis but may have a variety of other symptoms (e.g., gastrointestinal or respiratory).

## **Vaccine**

None.

## **Isolation and Quarantine Requirements**

**Isolation:** None

**Hospital:** Standard body substance precautions

**Quarantine:** None

## **CASE INVESTIGATION**

### **Reporting**

Report clinically-compatible cases diagnosed by a healthcare provider as viral (aseptic) meningitis, which are accompanied by:

- Laboratory evidence of enterovirus or herpes simplex virus (or other virus not listed as a reportable disease), and/or
- No evidence of bacterial, parasitic, or fungal meningitis.

## Case Definition

### Clinical Description

A syndrome characterized by acute onset of meningeal symptoms, fever, and CSF pleocytosis, with the presence of virus and bacteriologically sterile cultures.

### Laboratory Criteria

*Confirmed: Evidence of virus (or other virus not listed as reportable disease) and no evidence of bacterial, parasitic, or fungal meningitis.*

*Suspect: Clinically compatible case with no lab results.*

### Case Classification

*Confirmed: A clinically-compatible case diagnosed by a physician, with a laboratory evidence of a virus and without the evidence of bacterial, parasitic, or fungal meningitis.*

	Viral Meningitis
Criteria	Confirmed
<i>Clinical Evidence</i>	
Acute onset of meningeal symptoms (doctor diagnosed)	N
Fever	O
<i>Lab Evidence</i>	
Virus found	N
No lab evidence of bacteria, parasite or fungus	N
CSF pleocytosis (increased WBC count)	O

### Nosocomial

Cases of this kind are rare. Please consult with the Utah Department of Health (UDOH), Bureau of Epidemiology, regarding any nosocomial cases.

## Case Investigation Process

- Fill out a morbidity form.
- Fill out the investigation form.

## Outbreaks

An outbreak is defined as: A higher than usual number of reported cases in a particular geographic area. Identification of common risk factors, such as age, school, or workplace, may lead to the implementation of effective prevention and control measures.

## Identifying Case Contacts

None.

## Case Contact Management

There is no need for any medical treatment for people who have been in contact with a case of viral meningitis. The most effective way to prevent the spread of these viruses is through proper hand washing, good general hygiene, and following general sick precautions. This should be

communicated to the school or daycare facility or anyone that has been in contact with a person who has viral meningitis. It should be noted that most people with enteroviral infections do not develop meningitis but may have a variety of other symptoms (e.g., gastrointestinal or respiratory).

## ✓ **ACKNOWLEDGEMENTS**

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## ✓ REFERENCES

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## ✓ VERSION CONTROL

Updated February 9, 2020: Added “Critical Clinician Information,” “UT-NEDSS (EpiTrax) Minimum/Required Fields by Tab,” updated “Differential Diagnosis” section, updated References.

Updated February 8, 2017: Added “Why is Viral Meningitis Important to Public Health”, “Acknowledgements” and “Version Control” sections. Added information to “Reservoir”, “Transmission”, “Incubation Period” and “Prevention” sections. Updated “Case Fatality”, “Susceptibility”, “Chemoprophylaxis”, and “Case Contact Management” sections.

## ✓ UT-NEDSS (EPITRAX) MINIMUM/REQUIRED FIELDS BY TAB

### Demographic

- First name
- Last Name
- Date of Birth
- Ethnicity
- Race
- County
- State

### Clinical

- Date Diagnosed
- Date of Death
- Disease
- Onset Date

### Laboratory

- Collection Date

### Epidemiological

- Imported From

### Reporting

- Health

### Administrative

- Outbreak Name
- State Case Status
- Outbreak Associated