

Meningitis (Bacterial, Cryptococcal, Mycotic)

PROTOCOL CHECKLIST

- Enter available information into Merlin upon receipt of initial report
- Review background on disease (see page 2), organism, case definition (see page 4), and laboratory testing (see page 5)
- Contact provider
- If necessary (see page 5), facilitate laboratory testing of specimens at DOH Bureau of Public Health Laboratories (BPHL)
- Items to consider during the investigation include:
 - Review pathogen specific information
 - Modes of transmission
 - Incubation period
 - Symptoms/types of infection
 - Document clinical signs and symptoms
 - Document brief medical history, pre-existing conditions, and potential risk factors (i.e., invasive medical procedures) in Merlin case notes
 - Document if patient was hospitalized for reported illness and the outcome
- Enter additional data (i.e., exposure information) obtained from interview (if performed) and complete the extended data in Merlin

Meningitis (Bacterial or Mycotic)

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To identify individuals with bacterial or mycotic (fungal) meningitis and investigate the source of infection so that, if necessary, public health or medical interventions can be taken to prevent additional infections;
2. To identify transmission sources of public health concern and to stop transmission;
3. To detect outbreaks of illnesses due to these agents early enough to make a difference to the course of the outbreak;
4. To allow a better understanding of the descriptive epidemiology of infections in order to develop or evaluate prevention strategies.

B. Legal reporting requirements

Laboratories and physicians are required to report persons with bacterial or mycotic meningitis to the county health department no later than close of business the day following confirmatory testing or diagnosis.

C. County health department investigation responsibilities

1. Begin routine investigation within one business day.
2. Determine the need for and recommend measures to prevent additional infections.
3. Optional: For unusual infections of public health concern or during outbreak investigations, contact the laboratories as soon as possible after an infection is reported and request that the isolate be submitted to the Bureau of Public Health Laboratories (BPHL) for confirmation.
4. Report all confirmed cases of meningitis (bacterial or mycotic) in Merlin (CODE 32090).
 - a. The meningitis (bacterial or mycotic) case report form is available at:
http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/crf-active-bacterial.pdf.
 - b. Complete the extended data screen in Merlin.

2. THE DISEASE AND ITS EPIDEMIOLOGY

According to the CDC (2012), about 4,100 cases of bacterial meningitis and 500 deaths occurred each year from 2003–2007. Most cases of bacterial meningitis are caused by *Streptococcus pneumoniae*, *Neisseria meningitidis*, or *Haemophilus influenzae*. Less common causes of bacterial or mycotic meningitis tend to occur in persons with specific

medical risk factors (such as neonates and persons with impaired immunity), invasive medical procedures, or following head trauma. Additionally, some infections occur sporadically among persons with no known risk factors.

A wide variety of bacteria and fungi can be opportunistic causes of meningitis, particularly following invasive medical procedures (injections, surgery, etc.). Surveillance for meningitis, other, helps identify potential health care acquired meningitis. Outbreaks may occur as the result of exposure to contaminated products (food, injectable medications) or breakdown in routine infection control in medical facilities.

Group B *Streptococcus* (GBS), or *Streptococcus agalactiae*, meningitis most often occurs in infants and results from exposure to bacteria colonizing the mother during the birth process. Approximately 1,200 GBS infections among newborns < 1 week old are reported in the U.S. each year. Transmission of GBS is prevented by routine screening of pregnant mothers and administering intrapartum antibiotics to women that are colonized.

Fungal meningitis is rare and usually the result of infection with a fungus that spreads from blood to the cerebrospinal fluid. Cryptococcal meningitis can be acquired worldwide and is most common among adults with HIV infection. Meningitis associated with *Coccidioides* species typically occurs in arid and semiarid areas of the Western Hemisphere, where the mold inhabits the soil. Fungal meningitis is not contagious.

A. Etiologic agent

Various bacterial agents, including, but not limited to, *Staphylococcus sp.*, Group B *Streptococcus sp.*, and enteric bacteria such as *E. coli* and *Klebsiella pneumoniae*; various fungal agents including, but not limited to, *Cryptococcus sp.*, *Candida sp.*, *Histoplasma capsulatum*, *Blastomyces dermatitidis*, and *Coccidioides sp.*

B. Clinical description

Meningitis most commonly manifests with fever, headache, and a stiff neck; the disease may progress rapidly to shock and death. However, other manifestations may be observed.

Bacterial meningitis:

High fever, headache, and stiff neck are common symptoms of meningitis in anyone over the age of two years. These symptoms can develop over several hours, or they may take one to two days. Other symptoms may include nausea, vomiting, discomfort while looking into bright lights, confusion, and sleepiness. In newborns and small infants, the classic symptoms of fever, headache, and neck stiffness may be absent or difficult to detect; the infant may only appear slow or inactive, or may be irritable, have vomiting, or may be feeding poorly. As the disease progresses, patients of any age may have seizures.

Fungal meningitis:

Common symptoms of fungal meningitis include fever, headache, stiff neck, nausea and vomiting, sensitivity to light, and confusion.

C. Reservoir

Varies by organism

D. Modes of transmission

Varies by organism

The majority of bacteria that cause meningitis are not as contagious as diseases such as the common cold or flu. Some bacteria that cause meningitis can be transmitted by direct contact with an infected person's oral or nasal secretions. An infection with one of these organisms does not typically cause meningitis; exposure may result in colonization only. For these bacterial infections, there is no increased risk of meningitis among persons with close contact to cases. For GBS, infants may be infected or colonized during the birthing process.

Fungal meningitis is not contagious. Exposure to fungi known to be pathogenic occurs primarily from inhalation of airborne spores. Meningitis can develop after a fungus spreads from the blood to the central nervous system. Fungi may also be transmitted by injection of contaminated medication into or near the central nervous system.

F. Period of communicability

Varies by organism

G. TreatmentBacterial meningitis:

Bacterial meningitis is treated with antibiotics. The antibiotic of choice depends on the organism causing the infection.

CDC guidelines (2012) recommend that pregnant women be screened for GBS when 35-37 weeks pregnant. Those who test positive should receive antibiotics intravenously during labor to help prevent perinatal infection.

Fungal meningitis:

Treatment for fungal meningitis includes long courses of antifungal medications. Treatment length depends on the patient's immune system and the type of fungus involved in the infection.

H. Prophylaxis

None

I. Meningitis in Florida

Between 2008 and 2012, there was an average of 192 cases per year caused by a wide variety of organism.

3. CASE DEFINITION

A. Clinical description

Meningitis manifests most commonly with fever, headache, and a stiff neck; the disease may progress rapidly to shock and death. However, other manifestations may be observed.

B. Laboratory criteria for diagnosis

- Isolation of a bacterial, cryptococcal*, or fungal species from the cerebrospinal fluid (CSF);
OR
- Isolation of bacterial or fungal species from brain tissue;
OR
- Positive blood culture for a bacterial, cryptococcal*, or fungal species.

* Excluding meningitis caused by *Cryptococcus neoformans* or an unspecified *Cryptococcus* species. Culture-confirmed *Cryptococcus gattii* meningitis cases should be reported.

C. Case definition

- Confirmed: A clinically compatible case that is laboratory confirmed.

D. Comments

See the case definitions for *Haemophilus influenzae* (03841), *Listeria monocytogenes* (02700), *Neisseria meningitidis* (03630), *Streptococcus pneumoniae*, Invasive Disease (04823, and 04830) to report cases of meningitis caused by these organisms.

4. LABORATORY TESTING

A. Criteria for diagnosis

Bacterial or mycotic meningitis is most commonly diagnosed by isolation of an organism from the cerebrospinal fluid. Additionally, use of Gram stain, antigen tests, and molecular diagnostics may be clinically relevant for certain organisms.

B. Services available at the Bureau of Public Health Laboratories (BPHL)

BPHL can provide confirmation of organism identification and molecular testing for unusual infections of public health concern or during outbreak investigations. To determine if isolate submission is necessary, consult with the epidemiologist/laboratory liaison assigned to your region. All submissions should be accompanied by a:

1. Clinical Lab Submission Form:
http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/dh1847clinicallabsubmissionform.pdf

2. Packaging and shipping
 - a. http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/packagingflowchar0422051.pdf
 - b. http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/surveillance-and-investigation-guidance/_documents/packagingflowchartnotes0422051.pdf
3. Contact the regional laboratory for questions:
<http://dohiws/divisions/laboratories/Locations/Locations.htm>

5. CASE INVESTIGATION

A. Contact physician or hospital

1. Confirm that meningitis has been diagnosed in the reported patient.
2. Obtain the following:
 - a. Date of onset
 - b. Signs and symptoms
 - c. Type of infection
 - d. Predisposing medical conditions
 - e. Risk factors for infection
 - f. Laboratory tests performed
 - g. Treatment
3. Ask what information has been given to the patient.
4. Obtain as much demographic information as possible, including contact information.
5. Notify the physician if you will be contacting the patient.
6. Review the clinical history, physical exam findings and laboratory results.
7. Conduct an investigation of all infections that meet case definition.

B. Interview the patient

1. If necessary based on the public health concern following the initial investigation, contact the patient (or parent/guardian) to complete an interview.
2. Items to cover during interview:
 - a. Discuss the patient's risk factors for infection (i.e., invasive medical procedures, pre-existing medical conditions, etc.),
 - b. Symptoms and onset date of symptoms,
 - c. Exposure to other ill persons,
 - d. Travel history,
 - e. Hospitalization history,

- f. Pregnancy status

C. Identify potentially exposed persons

A contact investigation is generally not warranted during investigation of bacterial meningitis caused by species other than *N. meningitidis* or *H. influenzae*. Fungal meningitis is not contagious. If either contaminated medication or substantial breaches in infection control during a medical procedure are suspected to be the source of infection, the investigation of other potentially exposed persons may be warranted.

D. Merlin data entry

Create a case in Merlin under the disease code **Meningitis, Bacterial, Cryptococcal, Mycotic – 32090**. Enter the data collected into Merlin, include all required fields on the Basic Data screen, complete the Case Symptoms screen, and attach all relevant labs and case report forms. Please attach ALL labs received via electronic laboratory reporting (ELR) to the case. Ensure that the extended data screen in Merlin has been completed.

6. PREVENTION AND CONTROL

Prevention and control recommendations vary by organism. Consult with the *Red Book*, the *Control of Communicable Diseases Manual* and/or your Regional Epidemiologist at: http://www.floridahealth.gov/diseases-and-conditions/disease-reporting-and-management/disease-reporting-and-surveillance/_documents/investigationunitmap_11-22-13color.pdf.

7. REFERENCES

- A. Heymann, D.L. (Ed.). (2008). *Control of Communicable Diseases Manual* (19th ed.). Washington: American Public Health Association.
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- C. Kansas Department of Health. *Kansas Disease Investigation Guidelines*. Kansas Department of Health, 2010.
- D. CDC (2012). Fungal Meningitis. Retrieved from <http://www.cdc.gov/meningitis/fungal.html>
- E. CDC (2012). Bacterial Meningitis. Retrieved from <http://www.cdc.gov/meningitis/bacterial.html>
- F. CDC (2010). Prevention of Perinatal Group B Streptococcal Disease. *MMWR Recommendations and Reports*. Vol 59 (RR-10).

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