Meningitis, General

(Multiple etiologies)

REPORT ALL BACTERIAL MENINGITIS CASES IMMEDIATELY

Section 1:

ABOUT THE DISEASE

A. Etiologic Agent

Meningitis may be caused by a variety of infectious agents, including many types of bacteria, viruses, fungi, and parasites.

Streptococcus pneumoniae and *Neisseria meningitidis* are the two most common causes of bacterial meningitis in infants and young children in the U.S. Before the widespread use of *Haemophilus influenzae* type b conjugate vaccines, *Haemophilus influenzae* type b (Hib) was the most common cause of bacterial meningitis in children. All three of these pathogens are discussed in individual chapters, as noted in the box below. Meningitis caused by bacteria such as *Listeria monocytogenes*, group B streptococcus (GBS), group A streptococcus (GAS), *Escherichia coli* K-1, *Klebsiella* species, *Enterobacter* species, or *Serratia* species, are less common but are more likely in newborns, pregnant women, the elderly, and immunocompromised persons. In an immunocompromised host, many other types of bacteria may cause meningitis as well. Numerous species of fungi may also cause meningitis, including *Cryptococcus neoformans* and *Coccidioides immitus*.

This chapter is devoted to bacterial (including *E. coli* K-1, *Klebsiella*, *Enterobacter*, and *Serratia* species) and fungal (including *C. neoformans* and *C. immitus*) causes of meningitis that have not been allocated individual chapters.

Depending on the type of meningitis, you may need to refer to one of the following chapters:

- For meningococcal infections, including meningitis (caused by the organism *N. meningitidis*), refer to the *Meningococcal Infection (Invasive)* chapter.
- For *H. influenzae* infections, including meningitis caused by *H. influenzae* group B (Hib), refer to the *Haemophilus influenzae (Invasive)* chapter.
- For viral (aseptic) meningitis, refer to the *Meningitis, Viral (Aseptic)* chapter.
- For Group A streptococcal meningitis, refer to the *Group A Streptococcus (Invasive)* chapter.
- For Group B streptococcal meningitis, refer to the *Group B Streptococcus* chapter.
- For *L. monocytogenes* meningitis, refer to the *Listeriosis* chapter.
- For *S. pneumoniae* meningitis, refer to the *Streptococcus pneumoniae (Invasive Disease)* chapter.

B. Clinical Description

Meningitis is an inflammation of the membranes of the brain and the spinal cord. Symptoms vary but often include fever, stiff neck, headache, vomiting, lethargy, and sometimes rash. Neonatal meningitis may be accompanied by lethargy, seizures, and apnea, as well as other symptoms. The case-fatality rate for neonatal GBS meningitis is 25–50%. Untreated cryptococcal meningitis is also frequently fatal.

C. Vectors and Reservoirs

Humans are the reservoir for *S. pneumoniae, N. meningitidis, H. influenzae,* GAS, and GBS. The main reservoir for *C. neoformans, C. immitus,* and *L. monocytogenes* is the environment, especially soil.

D. Modes of Transmission

Modes of transmission vary depending on the organism. *S. pneumoniae* and *N. meningitidis* are transmitted from person to person primarily through respiratory secretions. GBS may infect a baby perinatally or through person-to-person contact after birth. Cryptococcosis and coccidioidomycosis occur primarily through inhalation of airborne spores.

E. Incubation Period

The incubation period varies depending on the etiologic agent, and in some cases, is not well-defined. It may be as short as 1–3 days for *S. pneumoniae.*

F. Period of Communicability or Infectious Period

The infectious period is unknown for both *S. pneumoniae* and GBS. Cryptococci and coccidioidal fungi are not transmitted from person to person.

G. Epidemiology

The epidemiology of bacterial meningitis has seen major shifts since Hib vaccines were introduced. Prior to Hib vaccines, Hib was one of the most common causes of bacterial meningitis in the U.S., affecting primarily infants and young children. After the introduction of Hib vaccine, *S. pneumoniae* has become the leading cause of bacterial meningitis in infants and the predominant cause of meningitis in people over 30 years old. Meningococcal meningitis is the second leading cause of bacterial meningitis overall and is the predominant cause in those 2–30 years old. GBS meningitis occurs in the 1–23 month age group. Cryptococcal infection can be acquired worldwide and is reported to occur in 5–10% of adults with HIV infection. Coccidioidomycosis occurs in arid and semiarid areas of the Western Hemisphere, where the mold inhabits the soil.

H. Bioterrorist Potential

The pathogens causative of less common forms of meningitis are not considered to be of risk for use in bioterrorism.

Section 2:

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report cases of health care provider-diagnosed bacterial or fungal meningitis, accompanied by laboratory results indicating the presence of bacteria or fungi in cerebrospinal fluid (CSF).

Note: See Section 3C for information on how to report a case. For meningitis caused by viruses, H. influenzae, N. meningitidis, L. monocytogenes, S. pneumoniae, and GAS, please refer to the reporting criteria sections of the chapters specific to these organisms.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Reference Laboratory has the ability to identify *S. pneumoniae*, *Listeria* sp., GBS, and GAS, in addition to many other pathogens. Occasionally, the SLI Reference Laboratory forwards CSF samples for *Cryptococcus* or *Coccidioides* to the Centers for Disease Control and Prevention (CDC) for testing.

For more information about testing and specimen submission, contact the SLI Reference Laboratory at (617) 983-6607.

Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To monitor reported cases to identify trends, and to facilitate appropriate control and prevention measures, as required.

B. Laboratory and Health Care Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's *Introduction* section) for information on which diseases to report. Meningitis (bacterial and/or community-acquired) is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of meningitis (bacterial and/or community-acquired), as defined by the reporting criteria in Section 2A.

The MDPH requests that cases of meningococcal meningitis (invasive infection) and *H. influenzae* meningitis (invasive infection) be reported immediately to the LBOH in the community where the case is diagnosed. If this is not possible, call the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. An epidemiologist is available 24 hours a day, 7 days a week. See the specific chapters on these infections for more information.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *S. pneumoniae, N. meningitides, H. influenzae, L. monocytogenes*, GBS, GAS, *E. coli* K-1, or *C. neoformans* from a normally sterile site shall report such evidence of infection, directly by phone, to the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

C. Local Board of Health (LBOH) Reporting and Follow-up Responsibilities

Reporting Requirements

MDPH regulations *(105 CMR 300.000)* stipulate that community-acquired meningitis is reportable to the LBOH and that each LBOH must report any confirmed or suspect case of community-acquired meningitis, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using the appropriate MDPH case report form. Meningitis caused by viruses, *N. meningitidis*, GAS, GBS, *H. influenzae, S. pneumoniae,* and *L. monocytogenes* is covered separately. Refer to the chapters on these infections for reporting information. For fungal and all other bacterial meningitis, use the MDPH *Generic Disease Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation (For Bacterial and Fungal Causes of Meningitis Not Covered in Other Chapters)

1. It is the responsibility of the LBOH to complete a MDPH *Generic Disease Case Report Form* (found at the end of this chapter).
2. Use the following guidelines to assist in completing the form:
   a. Accurately record the demographic information.
   b. Accurately record clinical information, including "meningitis" as the disease being investigated, date of symptom onset, symptoms, whether hospitalized, and hospital and clinician contact information.
   c. Indicate the bacterial or fungal species identified and the type of specimen from which it was isolated. This information can be recorded in the diagnostic laboratory test section.
   d. Record any other pertinent information in the "Comments" section at the bottom of the page.
   e. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.
3. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Section 4: CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements *(105 CMR 300.200)*

None.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases *except* for meningitis caused by *H. influenzae, N. meningitidis,* and *S. pneumoniae* for individuals <18 years of age (refer to the chapters specific to these infections for more information).

C. Managing Special Situations

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases in your city/town is higher than usual or if you suspect an outbreak, investigate to determine the source(s) of infection and the mode(s) of transmission. Identification of common risk factors, such as age, school, or workplace, may lead to the implementation of effective prevention and control measures. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division 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.

D. Preventive Measures

Personal Preventive Measures/Education

General measures to avoid many types of meningitis include frequent hand washing and avoiding sharing food, drinks, or eating utensils with other persons. There are also vaccines for Hib, *S. pneumoniae,* and *N. meningitidis.* Please refer to the *Haemophilus influenzae (Invasive)*, *Streptococcus pneumoniae (Invasive Disease),* and *Meningococcal Infection (Invasive)* chapters of this manual for more information on these vaccines.

Public Health Fact Sheets are available for many of these diseases from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the "Publications and Statistics" link, and select the "Public Health Fact Sheets" section under "Communicable Disease Control."

ADDITIONAL INFORMATION

The following is the formal CDC case definition for "Bacterial Meningitis, Other." It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

Clinical Description

Bacterial 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.

Laboratory Criteria for Diagnosis

- Isolation of a bacterial species from CSF.

Case Classification

Confirmed	A clinically-compatible case that is either laboratory-confirmed or is accompanied by a positive blood culture.

REFERENCES

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FORMS & WORKSHEETS

Meningitis, General

Meningitis, General

LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to meningitis (bacterial and fungal causes not covered in other specific chapters) case investigation activities.

LBOH staff should follow these steps when meningitis is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ❑ Immediately notify the MDPH Division of Epidemiology and Immunization, at (617) 983-6800 or (888) 658-2850, to report any confirmed or suspect case(s) of bacterial meningitis.
- ❑ Obtain laboratory confirmation.
- ❑ Fill out the case report form (attach laboratory results).
- ❑ Send the completed case report form (with laboratory results) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).