

# Meningococcal Disease

<b>Signs and Symptoms</b>	Symptoms are similar to those seen in other forms of bacterial meningitis, and typically include sudden onset of fever, headache, and stiff neck, often accompanied by other symptoms, such as nausea, vomiting, photophobia and altered mental status.		
<b>Incubation</b>	1-10 days, typically less than 4 days		
<b>Case classification</b>	<b>Clinical criteria:</b> Clinical purpura fulminans in the absence of a positive blood culture.		
	<p><b>Confirmed:</b> Detection of <i>N. meningitidis</i>-specific nucleic acid in a specimen obtained from a normally sterile body site using a validated polymerase chain reaction (PCR) assay; or</p> <p>Isolation of <i>N. meningitidis</i></p> <ul style="list-style-type: none"> <li>• From a normally sterile body site; or</li> <li>• From purpuric lesions.</li> </ul>	<p><b>Probable:</b> Detection of Neisseria meningitidis antigen</p> <ul style="list-style-type: none"> <li>• In formalin-fixed tissue by immunohistochemistry (IHC); or</li> <li>• In CSF by latex agglutination</li> </ul>	<p><b>Suspect:</b></p> <ul style="list-style-type: none"> <li>• Clinical purpura fulminans in the absence of a positive blood culture; or</li> <li>• Gram-negative diplococci, not yet identified, isolated from a normally sterile body site</li> </ul>
<b>Differential diagnosis</b>	Multiple cause: bacterial, viral, fungal, or parasitic meningitis, encephalitis, or sepsis; intracranial abscess or tumor; clotting disorder; vasculitis; autoimmune causes; toxins.		
<b>Treatment</b>	Empirical therapy for suspected meningococcal disease should include an extended-spectrum cephalosporin, such as cefotaxime or ceftriaxone. Once the microbiologic diagnosis is established, definitive treatment can be continued with an extended-spectrum cephalosporin (cefotaxime or ceftriaxone). If susceptibility of the meningococcal isolate to penicillin is confirmed, treatment can be switched to penicillin G or ampicillin.		
<b>Duration</b>	Without treatment, meningococcal disease can be fatal within a few days. Hospitalization after treatment can be lengthy. Permanent sequelae include deafness, loss of limb(s), brain damage		
<b>Exposure</b>	Meningococcal bacteria can be transmitted from person-to-person, by asymptomatic carriers or persons with invasive disease, through direct contact with large droplet respiratory secretions or saliva. Patients should be isolated and droplet precautions continued for 24 hours after administration of <b>appropriate</b> antibiotics. Many adults are colonized with <i>N. meningitidis</i> without experiencing disease.		
<b>Laboratory testing</b>	All isolates or specimens associated with a positive result should be submitted; PHL does routine testing for antibiotic resistance.		
	Keep isolate (culture) at <b>ambient temperature</b> , ship according to PHL requirements: <a href="https://doh.wa.gov/public-health-provider-resources/public-health-laboratories/lab-test-menu">https://doh.wa.gov/public-health-provider-resources/public-health-laboratories/lab-test-menu</a>		
<b>Public health actions</b>	Identify persons who have been significantly exposed to the index case, recommend antibiotic prophylaxis (chemoprophylaxis), as necessary, and to inform them about signs and symptoms of illness. Recommend prophylactic immunization in a defined population or community experiencing an outbreak.		

# Meningococcal Disease

## 1. DISEASE REPORTING

### A. Purpose of Reporting and Surveillance

1. To identify persons who have been significantly exposed to the index case, in order to recommend antibiotic prophylaxis (chemoprophylaxis) and to inform them about signs and symptoms of illness.
2. Under very rare circumstances, to recommend prophylactic immunization in a defined population or community.

### B. Legal Reporting Requirements

1. Health care providers and Health care facilities **immediately notifiable to local health jurisdiction.**
2. Laboratories: *Neisseria meningitidis* **immediately notifiable to local health jurisdiction**; specimen submission required – isolate from a normally sterile site (within 2 business days) or if no isolate available, specimen associated with positive result (within 2 business days of request by LHJ or DOH).
3. Local health jurisdictions: notifiable to Washington State Department of Health (DOH) Office of Communicable Disease Epidemiology (CDE) within 7 days of case investigation completion or summary information required within 21 days.

### C. Local Health Jurisdiction Investigation Responsibilities

1. Because of the potential for transmission of this serious infection, immediate public health action is required to identify and provide chemoprophylaxis for contacts of cases. Identify contacts and recommend prophylaxis within 24 hours of being notified about the case.
2. If the case is lab-confirmed, ensure that the isolate is forwarded to the Washington State Public Health Laboratory (PHL).
3. Report all confirmed, probable and suspect cases (see definitions below) to CDE. Complete the meningococcal disease case report form <https://www.doh.wa.gov/Portals/1/Documents/5100/210-038-ReportForm-Mening.pdf> and enter the data in the Washington Disease Reporting System (WDRS).

## 2. THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

*Neisseria meningitidis* is a gram-negative diplococcus with at least 12 confirmed serogroups based on capsular type.

A, B, C, Y, W and X are all capable of causing outbreaks. In the United States, B, C and Y are the most common serogroups.

### B. Description of Illness

The initial presentation of *N. meningitidis* caused by meningitis can include sudden onset fever, headache, nausea, vomiting headache, severe myalgias, nonspecific rash, sore

throat, and other upper respiratory symptoms. These symptoms can be confused for a multitude of other illnesses, including influenza since many meningococcal infections occur concurrently with influenza in late winter. The potential for rapid disease progression, especially given the possibility of death within hours of symptom onset, makes identifying meningococcal disease early challenging due to its low incidence and nonspecific early symptoms. Later presentation of the meningococcal disease includes neck stiffness, photophobia, petechiae or hemorrhagic rash, altered mental status, shock, abnormal skin color, purpura fulminans, or even disseminated intravascular coagulation.

### C. Meningococcal Disease in Washington

Please see the annual Communicable Disease Report located:

<https://doh.wa.gov/data-and-statistical-reports/diseases-and-chronic-conditions/communicable-disease-surveillance-data/annual-cd-surveillance-reports>

### D. Reservoirs

Humans are the only natural reservoir for *N. meningitidis*. It colonizes the nasopharynx before systemic infection.

### E. Modes of Transmission

Transmission occurs through respiratory droplets or by direct contact with nasopharyngeal secretions from a colonized person – symptomatic or otherwise. Close contacts of a case (e.g., household members or childcare contacts) are at increased risk of becoming colonized/infected and developing illness.

### F. Incubation Period

The incubation period is usually 3 to 4 days but may range from 2 to 10 days.

### G. Period of Communicability

Persons are infectious as long as meningococci are present in discharges from the nose or pharynx. Patients infected with *N. meningitidis* may be contagious in the 7 days before symptom onset and until 24 hours of effective antimicrobial therapy.

### H. Treatment

Early recognition and treatment of meningococcal infections are imperative in improving outcomes. Empiric treatment should start while awaiting culture results. This includes a third-generation cephalosporin such as ceftriaxone or cefotaxime. If culture identifies the organism as penicillin-susceptible, treatment can be switched to penicillin G, although continuing third-generation cephalosporin treatment is also an option. For patients who have significant allergies to penicillin and other beta-lactams, meropenem may be an alternative. Healthcare providers should **ascertain susceptibility** of meningococcal isolates to penicillin before using penicillin or ampicillin for treatment. The duration of antibiotic therapy is usually five to seven days but it depends upon on the patient's clinical response and culture sensitivity. Depending on the antimicrobials used, therapy for invasive disease may not eradicate the organism from the nasopharynx, and chemoprophylaxis may also be required.

Resistance to ciprofloxacin has been documented in some serogroup Y isolates in the United States (see <https://www.cdc.gov/mmwr/volumes/69/wr/mm6924a2.htm>), so all group Y isolates should be submitted for antimicrobial susceptibility testing.

For chemoprophylaxis recommendations, see Section 6.

### 3. CASE AND CONTACT DEFINITIONS

#### A. Clinical Description

Meningococemia is a blood infection due to the bacteria *Neisseria meningitidis*. bacteria enter the bloodstream and multiply, damaging blood vessels throughout the body and causing bleeding into the skin and organs. Meningococcal disease manifests most commonly as meningitis and/or meningococemia that may progress rapidly to purpura fulminans, shock, and death. However, other manifestations might be observed, as described in Section 2B.

#### B. Case Classifications (2015 Case Definition)

##### Case classification

###### *Suspected:*

- Clinical purpura fulminans in the absence of a positive blood culture; or
- Gram-negative diplococci, not yet identified, isolated from a normally sterile body site (e.g., blood or CSF).

###### *Probable:*

Detection of *N. meningitidis* antigen

- in formalin-fixed tissue by immunohistochemistry (IHC); or
- In CSF by latex agglutination.

###### *Confirmed:*

- Detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., blood or CSF), using a validated polymerase chain reaction (PCR) assay; or
- Isolation of *Neisseria meningitidis*
  - from a normally sterile body site (e.g., blood or cerebrospinal fluid, or, less commonly, synovial, pleural, or pericardial fluid), or
  - from purpuric lesions.

#### C. Close Contacts (of a person with meningococcal disease)

Meningococcal disease spreads by direct contact with infectious respiratory secretions and by droplet transmission. Such droplets generally travel 3 feet or less when an infected person talks, coughs, or sneezes.

Examples of close contact with meningococcal patients include:

1. Close contact with a symptomatic case-patient during the contagious period. This includes household and immediate household members, (those who spend many hours together or sleep under the same roof) and childcare center contacts, in the 7 days before symptom onset. and anyone directly exposed to an infected person's oral secretions or who are at increased risk for contact with respiratory secretions of the case.

2. An obvious exposure that involves direct contact with respiratory, oral, or nasal secretions from a case-patient during the contagious period (e.g., a cough or sneeze in the face, sharing eating utensils, sharing water bottles, sharing cigarettes or inhalational drug paraphernalia, kissing, mouth-to-mouth resuscitation, or performing intubation or nasotracheal suctioning without a mask). Health care workers who have not had direct contact with the case's nasopharyngeal secretions are *not* at increased risk, and prophylaxis is *not* indicated.
3. Close proximity for a prolonged period of time with a case-patient during the contagious. Passengers seated directly next to the index case during airline flights lasting more than 8 hours (gate to gate), or passengers seated within one seat in any direction from an index case on a flight of any duration if the index case was coughing or vomiting during the flight.

Note: Close contact does not include activities such as walking by a person or briefly sitting across a waiting room or office.

## 4. DIAGNOSIS AND LABORATORY SERVICES

### A. Diagnosis

Meningococcal disease is diagnosed by culture of *N. meningitidis* from a normally sterile site (e.g., blood, CSF) or purpuric lesions. Meningococcal disease may also be diagnosed through detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile site using a validated PCR assay. After administration of any antibiotics, sensitivity of bacterial culture can be low. In this situation, a Gram stain of CSF, assays to detect bacterial antigen in CSF, and polymerase chain reaction (PCR) tests for *N. meningitidis* DNA can be helpful. Identification of gram-negative diplococci identified in a sterile site specimen strongly suggests *N. meningitidis* but is not confirmatory. In special situations, CDE can facilitate submission of clinical specimens to CDC for molecular testing.

### B. Services Available at the Washington State Public Health Laboratories (PHL)

**Under Washington state regulation, all isolates of *N. meningitidis* obtained from patients with invasive meningococcal disease must be submitted to PHL.** Once received, PHL confirms the identification and determines the serogroup of *N. meningitidis* isolates. PHL does not perform PCR for *N. meningitidis* on blood or CSF specimens, or latex agglutination on CSF specimens. Antimicrobial susceptibility testing is routinely performed on all isolates.

Note that PHL require all clinical specimens have two patient identifiers, a name **and** a second identifier (e.g., date of birth) both on the specimen label and on the submission form. Due to laboratory accreditation standards, specimens will be rejected for testing if not properly identified. Also include specimen source and collection date. Keep isolate (culture) at ambient temperature, ship according to PHL requirements:

<https://doh.wa.gov/public-health-provider-resources/public-health-laboratories/lab-test-menu>

## 5. ROUTINE CASE INVESTIGATION

Interview the case (or parent/guardian) or, as necessary, close family members or others who may be able to provide pertinent information.

### A. Evaluate the Diagnosis

Review the clinical history, physical exam findings and laboratory results. Conduct a public health investigation for all confirmed, probable, and suspect cases.

### B. Identify Potential Sources of Infection and Potentially Exposed Persons

Identify all persons who had close contact (see Section 3C) with the case that could have resulted in exposure, and events (e.g., parties, sporting event, resuscitation) where close contact could have occurred. Obtain the name, address, and telephone number of exposed persons. Date of birth, weight, and any history of allergies will also be needed if chemoprophylaxis is to be provided.

Identifying the source of infection is often not possible, because of the relatively high percentage of the population who carry the organism. It is useful to ask whether any household, childcare, or other close contact has recently had an illness suggestive of meningococcal disease. However, clusters of meningococcal disease are rare, even among household members of cases.

Persons who had close contact with the case during the 7 days prior to onset until 24 hours after initiation of appropriate antibiotics should be offered prophylaxis. Close contacts of infected persons: Household members, childcare center contacts, anyone directly exposed to patient's oral secretions during the 7 days before symptom onset.

### C. Environmental Evaluation

Generally, none, although in outbreak settings an investigation may be warranted to identify environmental factors (e.g., disinfection practices, ventilation patterns, etc.) that may favor droplet transmission.

## 6. CONTROLLING FURTHER SPREAD

### A. Infection Control Recommendations

In addition to standard precautions, hospitalized patients should be cared for using droplet precautions until at least 24 hours after initiation of effective antibiotic treatment.

### B. Case Management

Some of the antibiotics commonly used for treatment do not reliably eradicate nasopharyngeal colonization. Unless ceftriaxone or ciprofloxacin (which are effective against colonization) was used, the patient should also be given chemoprophylaxis to eliminate carriage before hospital discharge (see Table 3).

### C. Contact Management

#### 1. Symptomatic Contacts

Contacts that are experiencing symptoms compatible with meningococcal disease (fever, rash, lethargy, irritability, headache, stiff neck, vomiting, and rash) should be referred to

a health care provider immediately for evaluation.

## 2. Antibiotic Prophylaxis

Chemoprophylaxis should be recommended for all household members and other persons deemed to have been exposed, regardless of their immunization status (see Section 5B). Administer as soon as possible, ideally less than 24 hours after identification of index patient. Chemoprophylaxis is not recommended for close contacts of patients with evidence of *N. meningitidis* only in nonsterile sites. Chemoprophylaxis is not recommended for persons who have had only brief or casual contact with the case. According to the CDC, chemoprophylaxis administered more than 14 days after the case onset is probably of limited or no value.

Due to recent reports of ciprofloxacin-resistant,  $\beta$ -lactamase-producing *N. meningitidis* serogroup Y cases in the United States, clinicians and public health staff should consider antimicrobial susceptibility testing on meningococcal isolates to inform prophylaxis decisions if their state has reported a case of meningococcal disease caused by ciprofloxacin-resistant strains within the past 2 years.

<https://www.cdc.gov/mmwr/volumes/69/wr/mm6924a2.htm>

## 3. Immunization

Three quadrivalent meningococcal conjugate vaccines are licensed for use in the United States for serogroups A,C,W,Y: MenACWY-D (Menactra), MenACWY-CRM (Menveo), and MenACWY-TT (MenQuadfi). The combination Hib and bivalent meningococcal conjugate vaccine, Hib-MenCY (MenHibrix), is no longer available in the United States.

Two recombinant serogroup B meningococcal (MenB) vaccines are licensed for use in the United States: MenB-FHbp (Trumenba) and MenB-4C (Bexsero).

*MMWR Recomm Rep.* 2020;69(RR-9):1-41. DOI: <http://dx.doi.org/10.15585/mmwr.rr6909a1>

## 4. Education

Potentially exposed persons should be instructed to watch for symptoms (fever, rash, lethargy, irritability, headache, loss of appetite, stiff neck, or vomiting) regardless of whether or not prophylaxis is recommended, and instructed to seek medical care immediately should such symptoms develop. Anxiety may be reduced if persons exposed 10 or more days prior to the current date are educated about the symptoms of invasive meningococcal disease and instructed that it is good health practice to see a health care provider any time symptoms of meningococcal disease develop.

# 7. MANAGING SPECIAL SITUATIONS

## A. Case Attends a Child Care Facility

If a child with invasive meningococcal disease has attended any such facility during the week before onset, then within 24 hours of the initial report:

1. Interview the operator and inspect the written attendance records to identify other possible cases among staff or attendees during the previous month. Note: [WAC170-295-3030](#) specifies that the operator keep a log of illnesses.
2. Notify the parents of children who are in the same classroom as the case (preferably in



writing) of the occurrence of meningococcal disease in an attendee. Day care operators are required to notify these parents that their child was exposed to a communicable disease through a letter or posted notification [WAC 170-295-3030](#). The notice should advise parents to seek chemoprophylaxis for their children without delay if their child attended on any of the same days that the case was present while likely infectious.

3. Advise parents to watch their children carefully for a 10 day period (after the index case was last present in the child care center at the same time as their child while likely contagious) for signs of illness, especially high fever, and to seek medical care immediately if illness should occur.
4. Instruct the childcare operator to notify the local health jurisdiction immediately if another person becomes ill with symptoms of meningococcal disease.
5. Recommend chemoprophylaxis to all staff in the ill child's classroom. Children and staff in other rooms are usually not at elevated risk, and therefore in most instances do not need chemoprophylaxis. However, it should be determined if children from multiple classrooms spend time together in one room at the beginning and/or end of the day.
6. It may be helpful to provide a fact sheet on meningococcal disease to all persons associated with the childcare when a case has occurred in a staff member or attendee, or even the parent of an attendee.

#### **B. Meningococcal disease outbreak-associated cases**

A meningococcal disease outbreak occurs when multiple cases of the same serogroup happen in a population over a short time period. They are defined as either organization- or community-based, depending on the nature of the affiliation among cases. Outbreak thresholds can be considered as guidance.

**Organization-based:** Cases are linked by a common affiliation other than a shared, geographically defined community. Examples are those that occur in universities, schools, child-care centers, or correctional facilities. Outbreak threshold definition: 2-3 outbreak-associated cases within an organization during a 3-month period.

**Community-based:** Cases have no common affiliations to an organization but are instead linked by a shared, geographically defined community, such as a neighborhood or town. Community outbreaks may include populations with shared characteristics, such as men who have sex with men, as long as no affiliation to a specific organization is identified. Outbreak threshold definition: Multiple outbreak-associated cases with an incidence of meningococcal disease that is above the expected incidence in a community during a 3-month period.

For control of meningococcal outbreaks caused by serogroups A, C, W, and Y, the preferred vaccine is a meningococcal conjugate ACWY conjugate vaccine. Either of the 2 licensed serogroup B vaccines be used in people 10 years and older during a serogroup B meningococcal disease outbreak.

<https://www.cdc.gov/meningococcal/downloads/meningococcal-outbreak-guidance.pdf>



### C. Laboratory workers handling *N. meningitidis*

Handling *N. meningitidis* bacteria and isolates in a laboratory setting can present a risk to laboratory workers. If there is a lapse in safety protocols or an accident involving a meningococcal isolate, laboratory workers may be exposed to the bacteria. In these situations, prophylaxis can be considered on a case-by-case basis in consultation with the Local Health Jurisdiction and with CDE.

## 8. ROUTINE PREVENTION

### A. Immunization Recommendations

Routine immunization schedules for children and adults can be found on CDC's website here: <https://www.cdc.gov/vaccines/schedules/hcp/index.html>

### B. Prevention Recommendations

Meningococcal vaccination is recommended for all preteens and teens. CDC also recommends clinicians vaccinate children and adults who are at increased risk for meningococcal disease. Chemoprophylaxis for close contacts of patients with meningococcal disease, regardless of immunization status. People should practice "respiratory etiquette" or good health manners to stop the spread of respiratory pathogens.

## ACKNOWLEDGEMENTS

This document is a revision of the Washington State Guidelines for Notifiable Condition Reporting and Surveillance published in 2002 which were originally based on the Control of Communicable Diseases Manual (CCDM), 17<sup>th</sup> Edition; James Chin, Ed. APHA 2000. We would like to acknowledge the Oregon Department of Human Services for developing the format and select content of this document.

## UPDATES

### December 2007 Revisions

Section 3B: CDE now requests that meningococcal pneumonia cases be reported as suspect rather than confirmed cases.

Section 3C (1-3): Revisions were made to the examples of close contact.

### March 2008 Revisions

Section 3B: Isolation of *N. meningitidis* from sputum in the absence of symptoms consistent with invasive disease should not be reported.

Section 5B: Revisions were made to guidance around prophylaxis of close contacts.

### May 2008 Revisions

Section 8A: Recommendations for meningococcal conjugate vaccine updated.

### January 2011 Revisions

The Legal Reporting Requirements section has been revised to reflect the 2011 Notifiable Conditions Rule revision.

### February Revisions 2011

Section 2G: More detailed language added to clarify the period of communicability.

Section 8A: Added new recommendations for revaccination of persons at prolonged increased risk for meningococcal disease. Updated recommendations for routine immunizations to include a booster dose published January 28, 2011.

### January 2015 Revisions

Section 2 C. updated to reflect recent disease trends in WA State.

Sections 3 and 4 A. updated to reflect new 2015 CSTE case definition which includes PCR as a confirmatory laboratory test.

Section 8 A. updated to include recommendations for the use of Hib-MenCY-TT vaccine in children at increased risk for meningococcal disease.

December 2022 Revisions

For 2023 WAC revision combined provider and facility reporting requirement, updated laboratory submission (Section 1B)

August 2023 Revisions

Added laboratory submission of specimen associated with a positive result on request of LHJ or DOH (2 business days of request)

Added Meropenem as a possible antibiotic choice

Meningococcal vaccines updated

Outbreak definition and appropriate prophylaxis updated

December 2023

For 2024 WAC revision updated laboratory submission.

June 2024:

CDC links updated

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