



Invasive Meningococcal Disease

Meningococcal disease

Causative bacterium: *Neisseria meningitidis*

- Gram (-) negative diplococcus
 - Further classified into at least thirteen serogroups
 - Serogroups A, B, C, Y, and W-135 cause the majority of invasive disease

Case definition

At least one of the following:

- Isolation of *Neisseria meningitidis* from a normally sterile site (e.g., cerebrospinal fluid [CSF], blood, joint, pleural, pericardial fluid, or another normally sterile site)
Isolation from urine, sputum, abscesses or pharyngeal swabs does not meet the case definition.
- Visualization of Gram-negative diplococci on Gram stain of CSF or blood
- Molecular detection of *N. meningitidis* by polymerase chain reaction (PCR) test, performed on CSF only
- Positive antigen test for *N. meningitidis* performed on CSF only

Signs and symptoms

May include:

- fever
- severe headache
- confusion
- stiff/rigid neck
- nausea/vomiting
- seizures
- petechial or purpuric rash
- photophobia (aversion to lights)

CSF analysis can be used to distinguish between bacterial and viral meningitis. Detection of increased white blood cells (predominantly neutrophils), elevated protein and a decreased glucose level in CSF are suggestive of a bacterial etiology, but are not specific to meningococcal disease.

Transmission

Transmission occurs via **direct contact with oral secretions**. The following exposures are examples of direct or intimate contact with oral secretions:

- Kissing
- Sharing eating utensils or drinking containers
- Sharing cigarettes (or other smoking materials)
- Performing CPR or endotracheal intubation
- Sharing toys in a day care setting with infants and toddlers

Incubation period: 1-10 days from exposure, generally 3-4 days

Period of communicability: Patient is considered infectious for 7 days prior to onset and until 24 hours after the initiation of appropriate antibiotic therapy.

Asymptomatic carriage is relatively common; it is estimated that up to 5-10% of the population has *N. meningitidis* in their nose and throat at any given time, without illness.

Priority for local public health response

*It is the responsibility of the clinician **and** the diagnosing laboratory to report a case of invasive meningococcal disease **by telephone** to local and/or state public health officials as soon as possible. Reporting via the Wisconsin Electronic Disease Surveillance System (WEDSS) is not sufficient notification.*

1. Ascertain clinical history of patient and how diagnosis was made. Determine or confirm:
 - Clinical signs and symptoms
 - Date of illness onset
 - Laboratory test results (specimen source, culture, Gram stain, antigen test, and CSF analysis, if applicable)
 - Refer to *Case definition* on page 1
 - Dates and time of antibiotic treatment that patient received
 - Determine if antibiotic treatment was started prior to collection of specimens for culture. If the patient was seen as an outpatient prior to admission, check whether antibiotics were prescribed at that time.
 - Meningococcal vaccination history (include the date, type of vaccine [polysaccharide or conjugate], manufacturer and lot number)
 2. Report by phone immediately (per Health Code, HFS 145) all potential cases of meningococcal disease to the Wisconsin Communicable Disease Epidemiology Section (CDES).
 - General number for CDES staff during weekdays: **(608) 267-9003**
 - Emergency number for on-call CDES staff after hours and on weekends: **(608) 258-0099**
(This number is for local health departments and clinical practitioners only, please do not distribute to the public.)
 3. Identify and advise direct contacts of case requiring prophylaxis (see *Contact investigation* on following page).
 4. Ensure that the diagnosing lab will send the bacterial isolate (if available) to the Wisconsin State Laboratory of Hygiene (WSLH) for serogroup determination.
 5. Determine if the case patient is a high school, college or vocational student. If so:
 - What year in school is the student?*
 - Did the student reside in a residence hall or in an apartment or house with roommates?*
 - Had the student received the meningococcal vaccine?*
 - What activities/travel did the student participate in during the 7 days prior to onset?*
- *This information is specifically requested by and reported to the CDC as part of the MeningNet national surveillance project.*
6. Enhance surveillance for additional cases:
 - Rapidly investigate suspect cases
 - Alert physicians in area of case
 7. Investigate potential links between cases.

Contact investigation – Who needs prophylactic treatment?

Interview the patient if possible. Otherwise, interview parents, family, and friends to identify contacts of the case patient during the 7 days before illness onset.

It is important to talk to friends of adolescent-aged case patients. Parents might not be aware of intimate partners and other potential exposures, such as shared cigarettes, marijuana joints, and/or drinks.

Chemoprophylaxis is recommended for the following high-risk contacts:

- Household contacts, especially children younger than 2 years of age
- Child care or pre-school contacts (both attendees and staff)
- Intimate partners
- Ambulance/EMS and other healthcare personnel exposed to respiratory secretions (e.g., during mouth-to-mouth resuscitation, endotracheal intubation, suctioning)
- Other persons who had direct exposure to index patient's oral secretions through kissing, drinking from the same glass or bottle, or sharing eating utensils, a toothbrush, or smoking material. Consider contacts at:
 - after-school programs
 - social and sporting events
 - church or workplace

Chemoprophylaxis is generally not recommended for the following low-risk contacts:

- Casual contact at school and work, without direct exposure to index patient's oral secretions
- Contact of a contact, with no direct exposure to the index patient
- Healthcare professional contact without direct exposure to patient's oral secretions

Mass vaccination or mass chemoprophylaxis is only recommended in outbreak situations. The Wisconsin Communicable Disease Epidemiology Section (CDES) will help determine if such measures are necessary.

Persons with less direct contact can be monitored for signs and symptoms of disease for the duration of the incubation period. Promptly evaluate and treat as necessary if potential symptoms develop.

Chemoprophylaxis

- Ideally, provide chemoprophylaxis to contacts within 24 hours of diagnosis of index case.
- Chemoprophylaxis administered more than 14 days after contact with patient occurred has little value (Red Book, 2009).
- Chemoprophylaxis is only necessary for people exposed directly to the patient's oral secretions while he/she was infectious (patient is considered infectious for 7 days prior to date of illness onset and until 24 hours after initiation of appropriate antibiotic therapy – Red Book, 2009).

Antibiotic regimens

The following regimens are appropriate for chemoprophylaxis of contacts.

Agent*	Dose	Duration	Cautions
<i>Rifampin</i>			
	Adults: 600 mg, p.o., b.i.d.	2 days	Not recommended during pregnancy
	Children \geq 1 month: 10 mg/kg, p.o., b.i.d.	2 days	Stains urine and tears; avoid contact lens use
	Children < 1 month: 5 mg/kg, p.o., b.i.d.	2 days	
<i>Ciprofloxacin</i>			
	Adults only: 500 mg, p.o.	1 dose	Not recommended during pregnancy or lactation
<i>Ceftriaxone</i>			
	Adults: 250 mg, i.m.	1 dose	May be mixed with 1% xylocaine to reduce injection pain
	Children < 15 years: 125 mg, i.m.	1 dose	

*Certain antibiotics could decrease the effectiveness of oral contraceptives.

Red Book: 2009 Report of the Committee on Infectious Diseases, 28th ed., pg. 460.

Ensure terminal prophylaxis of case patient. Antimicrobial therapy of invasive meningococcal disease with agents other than a third-generation cephalosporin or ciprofloxacin might not reliably eliminate nasopharyngeal carriage of *N. meningitidis*. If the patient was not treated therapeutically with a third-generation cephalosporin or ciprofloxacin, ensure that the patient receives one of the three antibiotics in the table above to eliminate nasopharyngeal carriage (terminal prophylaxis) prior to discharge from hospital.

Chemoprophylaxis of contacts after exposure to case patients on aircraft

Risk is related to the duration of the flight and seating proximity to the case patient.

- For flights > 8 hours, including ground time, passengers seated in the same row, directly adjacent to the case patient should be considered for chemoprophylaxis.
- For flights \leq 8 hours, no prophylaxis is advised.
- Personnel from the airlines, CDC quarantine stations, Wisconsin Division of Public Health, and local health departments should collaborate to determine the identities and risk of aircraft passengers and crew members.

Roles and responsibilities during a case of meningococcal disease

Local Health Department (LHD)

See *Priority for local public health response* on page 2

Hospital Infection Preventionist (IP)

1. Notify LHD about any confirmed or suspect cases of meningococcal disease by phone immediately. Provide LHD with details about the clinical history and laboratory diagnosis.
2. Identify medical personnel (including EMTs) directly exposed to saliva of case patient via resuscitation/endotracheal tube management. Arrange for chemoprophylaxis for these persons and notify LHD that they have been treated.
3. Ensure case patient receives terminal prophylaxis to eliminate carriage before release from the hospital.
4. Request that the laboratory send the bacterial isolate to the WSLH for serogroup determination.

Wisconsin State Laboratory of Hygiene (WSLH)

1. Serogroup the bacterial isolate and perform antibiotic susceptibility testing. Notify CDES of results.
2. Perform PFGE or PCR testing on bacterial isolates if requested by CDES.
3. Report results to submitting laboratory and CDES.
4. Send specimens to CDC for cases eligible for the Meningococcal Conjugate Vaccine study.

Wisconsin Communicable Disease Epidemiology Section (CDES)

1. Coordinate investigations that are multi-jurisdictional.
2. Assist in determining which persons need chemoprophylaxis.
3. Enhance surveillance for additional cases, as needed. Provide templates of letters to the LHD (e.g., to healthcare providers, to parents of children in school or daycare, to workplaces).
4. Confirm that the bacterial isolate is received at the WSLH for serogroup determination.
5. Request PCR from WSLH on culture-negative isolates when appropriate.
6. Review historical and prospective data and investigate links between cases.
7. Request PFGE analysis of select isolates when a possible link is identified.
8. If necessary, review clinical and laboratory data if case status is in doubt.
9. Follow CDC's MeningNet protocols to determine if case is eligible for the Meningococcal Conjugate Vaccine (MCV4) study. Process case as necessary. Enroll cases and controls.

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Meningococcal pneumonia

Although communicability is a theoretic possibility, data are conflicting as to whether to support the chemoprophylaxis of direct contacts of case patients with meningococcal pneumonia. Collect information on laboratory (e.g., Gram stain) and radiography results and contact CDES to determine whether chemoprophylaxis and/or follow up with contacts are needed.

Meningococcal vaccine

Currently, there are three meningococcal vaccines licensed in the United States which are approved for use in children and adults (Menveo® was approved by the FDA in February 2010):

- Menveo® (MCV4): meningococcal (A, C, Y, W-135) oligosaccharide diphtheria CRM₁₉₇ conjugate vaccine
- Menactra® (MCV4): meningococcal (A, C, Y, W-135) polysaccharide diphtheria toxoid conjugate vaccine
- Menomune® (MPSV4): meningococcal (A, C, Y, W-135) polysaccharide vaccine

No vaccines are currently available in the United States for the prevention of serogroup B strains.

Populations at increased risk of meningococcal disease for whom vaccination is recommended

(See *Recommended immunization schedules* for children, adolescents, and adults at:

<http://www.cdc.gov/vaccines/recs/schedules/default.htm#child>)

- Young adolescents aged 11-12 years (*Note: The Advisory Committee on Immunization Practices (ACIP) recently approved a one-time booster dose of MCV4 at age 16 years if routinely vaccinated at age 11-12 years at the preadolescent vaccination visit. For adolescents vaccinated at age 13-15 years, a one-time booster dose should be given at age 16-18 years. No booster is needed if the primary dose is given at or after age 16 years.*)
- Newly aggregated adults (e.g., college freshmen living in dormitories, military recruits)
- Incoming refugees from or travelers to areas of endemic meningococcal disease (See *Meningococcal Disease* in the *CDC Yellow Book* at: www.cdc.gov/travel)
- Microbiologists who routinely work with isolates of *N. meningitidis*
- Persons who have had a splenectomy or have abnormal splenic function
- Persons with certain immune deficiencies (e.g., complement deficiencies)
- Persons who have received cochlear implants, have permanent CSF shunts or physical characteristics, such as facial fractures, making them more susceptible to *N. meningitidis*

References

- Heymann DL, ed. Meningococcal infection. In: *Control of Communicable Diseases Manual*. 19th ed. Washington, DC: American Public Health Association, 2008:415-421.
- Pickering LK, ed. Meningococcal infections. In: *Red Book: 2009 Report of the Committee on Infectious Diseases*. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2009:455-463.
- Centers for Disease Control and Prevention. Exposure to patients with meningococcal disease on aircrafts – United States, 1999-2001. *MMWR* 2001;50(23):485-9.
- Centers for Disease Control and Prevention. Meningococcal disease. In: Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 11th ed. Washington, DC: Public Health Foundation, 2009:177-187.
- Centers for Disease Control and Prevention. Prevention and control of meningococcal disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2005;54(no. RR-7).
- Centers for Disease Control and Prevention. Prevention and control of meningococcal disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2000;49(no. RR-7).
- National Foundation for Infectious Diseases. The changing epidemiology of meningococcal disease among U.S. children, adolescents and young adults. November, 2004:1-15.