Meningococcal Disease

Organism: There are multiple serogroups of *Neisseria meningitidis.* Serogroups B, C, and Y cause the majority of disease in the United States. Serogroup W-135 causes a small proportion of disease, and serogroup A causes disease in developing countries and the Meningitis Belt of sub-Saharan Africa.

Incubation period: Usually 3 to 4 days, but may range from 2 to 10 days.

Infectious period: Until meningococci are no longer present in discharges from nose and mouth, usually within 24 hours after appropriate antimicrobial treatment begins.

Transmission route: Transmission is by direct exposure to droplets or direct contact with discharges from the nose or throat of a colonized person—symptomatic or otherwise. It is important to distinguish colonization from disease. Colonization is common, but invasive disease is very rare.

Treatment: Standard therapy is Penicillin G or ampicillin. Alternative therapies include third generation cephalosporins or chloramphenicol. If the patient is not treated with a third-generation cephalosporin (ceftriaxone, cefotaxime) at some point during their illness, they should receive rifampin (or ciprofloxacin or ceftriaxone IM) to eradicate pharyngeal carriage of *N. meningitidis*.

Information Needed for the Investigation

- **Verify the Diagnosis: Invasive meningococcal disease is a Public Health emergency.** The Section of Epidemiology (SOE) should notify appropriate partners (e.g., Immunization Program, PHNs, Preparedness Program, CDC/AIP, local providers, etc.) if there is suggestion of a possible outbreak.

- **Clinical Description:** Meningococcal disease describes the spectrum of infections caused by *Neisseria meningitidis*, including meningitis, bacteremia, and bacteremic pneumonia. Meningococcal disease develops rapidly, typically among previously healthy children and adolescents, and results in high morbidity and mortality. Invasive disease may occur without signs of meningitis. In infants and small children, fever and vomiting are often the only symptoms. **All clinical illnesses associated with *N. meningitidis* are significant and warrant investigation**. In the absence of associated invasive disease, finding *N. meningitidis* in sputum (or other nonsterile site) is not considered a remarkable event, and is not reportable.

Determine the Extent of Illness

- Obtain close contact list of case with locating information so that prophylaxis may be administered ASAP. The decision to treat contacts may be based at times on the clinical presentation of the case-patient without waiting for laboratory confirmation.
- Determine if household or other close contacts are, or have been ill by contacting local PHNs, providers, etc.
- **Chemoprophylaxis is recommended for all persons who have had close contact with the suspected meningococcal case during the 7 days preceding the onset of symptoms.** This should be done as soon as possible (Ideally, <24 hours after identification of the index patient). Conversely, chemoprophylaxis administered >14 days after onset of illness in the index patient is probably of limited or no value.
- High risk contacts include: household contacts; contacts close enough to have shared food, drink, eating or drinking utensils, cigarettes, toothbrushes, water bottles, lipstick or other things that contain saliva, or have kissed the case on the mouth; children in childcare; health care personnel if mouth-to-mouth resuscitation given or unprotected contact during intubation or suctioning; and persons frequently sharing the same sleeping space - military personnel, college dormitories, prison, long-term care facilities, shelters, etc.
- Chemoprophylaxis is not recommended for close contacts of patients with evidence of *Neisseria meningitidis* only in nonsterile sites such as an oropharyngeal swab, endotracheal secretions, or conjunctival swab. Reports of secondary cases after close contact to persons with noninvasive pneumonia or conjunctivitis are rare; there is no evidence of substantive excess risk. Furthermore, there is no indication to treat persons who are asymptomatic nasopharyngeal carriers. No testing of contacts is warranted.

Laboratory Specimens

- Serum – Blood cultures should be obtained prior to the start of antibiotic therapy, but should not delay the initiation of treatment. WBC usually elevated 1000-5000/mm^3 with a neutrophil predominance.
- CSF – Initial evaluation often includes lumbar puncture to determine if CSF findings are consistent with diagnosis. CSF findings may include elevated opening pressure, elevated protein, decreased sugar (<40mg/dl), and Gram stain showing gram-negative diplococci.
- If suspect meningococcal disease, request Gram stain ASAP from petechiae or purpuric scraping, CSF or a sample of the buffy coat from spun blood.
- Request that the isolate be sent to CDC/AIP for confirmation and serogroup identification. Note: Clinical specimens may be submitted to CDC-AIP on a case by case basis for PCR detection of *Neisseria meningitidis, Streptococcus pneumoniae*, and *Haemophilus influenzae*. SOE ***must*** consult a nurse or medical epidemiologist at CDC-AIP (729-3400) for specimen acceptance and testing approval. Generally, these samples are those obtained *after* antibiotics were administered and show no growth on traditional culture.
- Positive antigen test results from urine or serum samples are unreliable for diagnosis.

Contact and Control Measures

- Rifampin, ceftriaxone and ciprofloxacin are equally effective prophylactic agents. *Note:* The decision to treat contacts may be based at times on the clinical presentation of the case patient without waiting on laboratory confirmation.

- Chemoprophylaxis is not recommended for "low risk" or casual contacts or health care workers with no history of direct exposure to index patient's oral secretions.
- Decisions and provisions for prophylaxis of health care workers are usually made by the treating facility. Ensure that the facility also contacts any EMS personnel if applicable.

Table 3.42. Recommended Chemoprophylaxis Regimens for High-Risk Contacts and People With Invasive Meningococcal Disease

Age of Infants, Children, and Adults	Dose	Duration	Efficacy, %	Cautions
Rifampin[a]				
<1 mo	5 mg/kg, orally, every 12 h	2 days		Discussion with an expert for infants <1 mo
≥1 mo	15-20 mg/kg (maximum 600 mg), orally, every 12 h	2 days	90-95	Can interfere with efficacy of oral contraceptives and some seizure and anticoagulant medications; can stain soft contact lenses
Ceftriaxone				
<15 y	125 mg, intramuscularly	Single dose	90-95	To decrease pain at injection site, dilute with 1% lidocaine
≥15 y	250 mg, intramuscularly	Single dose	90-95	To decrease pain at injection site, dilute with 1% lidocaine
Ciprofloxacin[a,b]				
≥1 mo	20 mg/kg (maximum 500 mg), orally	Single dose	90-95	
Azithromycin	10 mg/kg (maximum 500 mg)	Single dose	90	Not recommended routinely; equivalent to rifampin for eradication of *Neisseria meningitidis* from nasopharynx in one study of young adults

[a]Not recommended for use in pregnant women.
[b]Use only if fluoroquinolone-resistant strains of *N meningitidis* have not been identified in the community.

Reference: 2018-2021 Red Book: Report of the Committee on Infectious Diseases, American Academy of Pediatrics.

- Close surveillance of high-risk contacts for at least 14 days will ensure prompt treatment of secondary cases that might occur in the absence of effective chemoprophylaxis.
- Exposed household, childcare and other close contacts should be carefully observed for early signs of illness, especially fever, with prompt initiation of treatment if needed.
- Signed Standing Orders for antibiotic prophylaxis are available on the
  P: drive/Infectious/Drug Room-Pharmacy/Standing Orders, and
  P: drive/Disease-Specific/ Meningococcal/MMM Chapter/2018.

Special Circumstances

- Air Travel: SOE should promptly notify the CDC Anchorage Quarantine Center (907-271-6301) if the case-patient has had air travel of >8 hours, including ground time, in the 7 days prior to illness onset. Passengers who are seated immediately next to a case-patient are more likely to be exposed directly to the patient's oral secretions and are probably at higher risk than those seated farther from the patient. In the absence of data about increased risk to other passengers, antimicrobial chemoprophylaxis should be considered for those passengers seated in either seat next to the patient: http://www.cdc.gov/mmwr/pdf/wk/mm5023.pdf
- Multiple Cases: If three or more confirmed or probable cases of meningococcal disease of the same serogroup among persons who have a common affiliation but not close contact occur within a 3-month period, a primary attack rate should be calculated. SOE should notify parents, health care providers and emergency rooms in the area of the occurrence of *N. meningitidis*. See sample letters, Epidemiology Bulletins and Fact Sheet. CDC guidance on evaluating and managing suspected outbreaks of meningococcal disease is available here: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a3.htm?s_cid=rr6202a3_w
- Day Care: If the child has attended any such facility for at least 4 hours (cumulatively) during the week before onset, then within 24 hours of the initial report:
    1. The operator of the day-care facility should be interviewed to determine whether other cases of meningococcal disease occurred among attending children during the past 60 days.
    2. The parents of children who are in the same classroom as the case should be notified (preferably in writing) of the occurrence of meningococcal disease in the facility. The notice should advise parents to:
        - Seek chemoprophylaxis for their attending children without delay.
        - Watch their children carefully for a 2-week period for signs of illness, especially fever, and seek medical care immediately if illness should occur.
        - Advise parents that an elevated risk may persist for up to 2 months following the occurrence of a case.
    3. Instruct the day-care operator to notify the SOE immediately if another person becomes ill with signs and symptoms of meningococcal disease over the next 2 months.
    4. Chemoprophylaxis should also be given to all staff in the ill child's classroom.
    5. Children and staff in other rooms are usually not at elevated risk, and do not need chemoprophylaxis.

  (Adapted from Oregon Public Health Meningococcal Disease Investigation Guidelines: http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/ReportingCommunicableDisease/ReportingGuidelines/Documents/mening.pdf Last updated Feb 2015)

Vaccine

Four vaccines are licensed in the US and provide protection against four (A, C, W, and Y) and two (C and Y) serogroups. Vaccines that protect against serogroup B meningococcal disease are not available in the US. Meningococcal vaccination is recommended for groups at increased risk for disease, including adolescents, persons with certain medical conditions, and persons with

increased risk for exposure. The number of vaccine doses (i.e., 2- or 4-dose primary series or a single dose with or without a booster dose) and vaccine product are determined by the indication for vaccination and age. Advisory Committee on Immunization Practices (ACIP) recommendations (available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a1.htm) for meningococcal vaccination are summarized below:

- Routine vaccination of adolescents aged 11 through 18 years (a single dose of vaccine should be administered at age 11 or 12 years, with a booster dose at age 16 years for persons who receive the first dose before age 16 years) (*1*, *5*–*7*).
- Routine vaccination of persons aged ≥2 months at increased risk for meningococcal disease, including (*7*–*11*):
    - Persons aged ≥2 months with certain medical conditions such as anatomical or functional asplenia or complement component deficiency (dosing schedule and interval for booster dose varies by age at time of previous vaccination).
    - Special populations such as unvaccinated or incompletely vaccinated first-year college students living in residence halls, military recruits, or microbiologists with occupational exposure (indication for booster dose 5 years after prior dose if at continued risk).
    - Persons aged ≥9 months who travel to or reside in countries in which meningococcal disease is hyperendemic or epidemic, particularly if contact with the local population will be prolonged.
- Vaccination of persons in at-risk groups (see Appendix B) to control outbreaks.

- Mass vaccination may be indicated in certain community-based or organization-based (e.g., university) outbreaks when certain criteria are met. See CDC guidance available here: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a3.htm?s_cid=rr6202a3_w

Hospital Considerations

- In addition to standard precautions, hospitalized cases should be placed under droplet precautions until at least 24 hrs after initiation of antimicrobial therapy. Some of the antibiotics commonly used for treatment do not reliably eradicate nasopharyngeal colonization. Unless rifampin, ceftriaxone or ciprofloxacin (which are effective against colonization) were used, the patient should also be chemoprophylaxed with an effective antibiotic before hospital discharge.
- Chemoprophylaxis is not recommended for health care workers with no history of direct exposure to index patient's oral secretions.

Reporting Requirements

- Enter *suspect, confirmed and probable* cases into NBS.
- Complete the meningococcal disease FTR template for *suspect, confirmed and probable* cases. A detailed written report should also be written in a large outbreak or investigation.
- *N. meningitidis* is one of the five organisms under shared surveillance with CDC/AIP; follow the SOPs that govern that program regarding notification of incident cases data-sharing.

- As of fall 2014, SOE was funded for an enhanced surveillance project for *N. meningitidis* through the CDC/ELC grant. Periodically, additional data elements are sent to CDC by SOE; and isolates sent by ASPHL for further molecular characterization.

References:

CDC Meningococcal Disease publications webpage:
http://www.cdc.gov/meningococcal/pubs-tools/publications.html

CDC 2015 Case Definition Meningococcal Disease webpage:
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CDC. Epidemiology and Prevention of Vaccine-Preventable Diseases: The Pink Book (12th edition, 2012) Chapter 13; Meningococcal Disease
http://www.cdc.gov/vaccines/pubs/pinkbook/mening.html

CDC. Manual for the Surveillance of Vaccine-Preventable Diseases. Chapter 8: Meningococcal Disease, April 2018. http://www.cdc.gov/vaccines/pubs/surv-manual/chpt08-mening.html

Control of Communicable Diseases Manual, 20th Edition Edited by David L. Heymann Washington, DC: American Public Health Association, 2015.

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http://www.cdc.gov/hicpac/pdf/isolation/isolation2007.pdf

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