



DISEASE INVESTIGATION PROTOCOL MENINGOCOCCAL INVASIVE DISEASE

Meningococcal disease is caused by a bacterium, *Neisseria meningitidis*. Symptoms are fever, rash, headache, stiff neck, nausea, vomiting, photophobia or altered mental status. Meningococcal disease presents most commonly as meningitis and/or meningococemia that may progress rapidly to purpura fulminans, shock, and death. However, other manifestations may be observed.

- A. Clinical Case Definition:** Consult the Arizona Department of Health Services “Case Definitions for Reportable Communicable Morbidities for the Current Year <http://www.azdhs.gov/phs/oids/investigations/casedefinitions.htm>. Or in the share drive Shared Data-Epidemiology-Disease Protocols and Supporting Documents- ADHS Documents-Current Year ADHS Case Definitions

- B. Laboratory Criteria for Case Classification:** Consult the Arizona Department of Health Services “Case Definitions for Reportable Communicable Morbidities for the Current Year <http://www.azdhs.gov/phs/oids/investigations/casedefinitions.htm>. Or in the share drive Shared Data-Epidemiology-Disease Protocols and Supporting Documents- ADHS Documents-Current Year ADHS Case Definitions

- C. Case Classification:** Consult the Arizona Department of Health Services “Case Definitions for Reportable Communicable Morbidities for the Current Year <http://www.azdhs.gov/phs/oids/investigations/casedefinitions.htm>. Or in the share drive Shared Data-Epidemiology-Disease Protocols and Supporting Documents- ADHS Documents-Current Year ADHS Case Definitions

- D. Laboratory Testing:** Consult the <http://www.azdhs.gov/lab/microbiology/index.php>. Choose Guide to Laboratory Services: Microbiology or call 602-542-1190

Gold Standard: Recovery of meningococci from a normally sterile site, primarily cerebrospinal fluid (CSF) or blood. Microscopic examination of gram stained smears.

Test	Specimen & Transport	Testing Availability
Gram stain	CSF or other normally sterile body fluids, Skin scraping of petechial or purpuric lesions	Available at local laboratory
Culture	CSF, blood, petechial aspirates, biopsy samples, joint fluid, other normally sterile body fluids. Transport using chocolate agar slants, culture plates or isolates on Amies or Stuarts swabs. Reference ASL manual for transport.	Available at local hospital laboratory, and ASL

- E. Bioterrorism Potential:** None.

F. Outbreak Definition: Community outbreak of one or more cases confirmed by the Arizona State Laboratory within a 10 day period or Diagnosis of > 3 confirmed or probable cases of meningococcal disease of the same serogroup in period < 3 months among persons with a common affiliation but no close contact with each other.

G. Investigator Responsibilities & Investigation:

Time frame: All confirmed and suspect cases are to be reported within 24 hours to the PCHD. Investigational activities should begin immediately and the Chief Medical Officer (CMO) must be informed of suspect case as soon as possible.

Report all confirmed, probable and suspect cases to ADHS Office of Infectious Disease Epidemiology Section, within 24 hours of initial report.

Investigation Forms: <http://www.azdhs.gov/phs/oids/investigations/forms.htm>

1. Confirm Diagnosis:

- a. Confirm diagnosis with appropriate medical provider.
- b. Before contacting the patient or family, discuss what they have been told about his/her evaluation for disease.

2. Conduct Case Investigation:

- a. Obtain information that supports clinical findings in the case definition and information on the onset date of the symptoms.
- b. Obtain information on any laboratory tests performed and results. Collect CSF information and reference ranges on:
 - Cell count
 - Protein level
 - Glucose level
 - Culture results (growth on plate?)
 - Gram stain results (Gram negative diplococci)
- c. Gram stain results should be available within 1 hour of CSF collection. Culture results may take more than 48 hours.
- d. If *N. meningitidis* was isolated from clinical specimen, ensure bacterial isolate was sent to the Arizona State Lab.
- e. For hospitalization, obtain medical records, including admission notes, Progress notes, lab report(s), and discharge summary.

3. Conduct Contact Investigation:

- a. Conduct contact investigation to locate additional cases and/or close contacts. Close contacts are:
 - Household members,
 - Child care center contacts
 - Persons directly exposed to the patient's oral secretions (e.g., through mouth-to-mouth resuscitation, kissing, sharing cigarette, etc.).

- b. Determine if case is involved in a high-risk occupation or if another special situation is involved (i.e. college, residential facility, health care, lengthy air travel, etc.) to locate additional cases and/or close contacts

4. Initiate Control and Prevention Measures:

- a. Initiate control and prevention measures to prevent spread of disease. Refer to *“Isolation, Work and Child Care Restrictions”* (Section 5) and *“Contact Management”* (Section 7)
- b. Provide education that includes basic information about the disease including means of transmission, symptoms, incubation period and the importance of seeking medical attention if symptoms develop.

5. Isolation, Work and Child Care Restrictions

Per **A.A.C. R9-6-352**, cases shall be Isolated and have instituted droplet precautions for a meningococcal invasive disease case for 24 hours after the initiation of treatment.

6. Case Management: Assure appropriate treatment was received by case(s). Refer to the *“Red Book: Report of the Committee on Infectious Diseases”*

7. Contact Management:

- a. Evaluate level of risk of transmission from each contact’s exposure to case. Close contacts should be considered for chemoprophylaxis.
 - Chemoprophylaxis is warranted for:
 - People who have been exposed directly to a patient’s oral secretions through close social contact, such as kissing, sharing of toothbrushes, cigarettes, or eating utensils
 - Child care and preschool contacts during the 7 days before onset of disease in the index case
- b. Decisions about providing contacts with chemoprophylaxis should be made after consulting with the Chief Medical Officer (CMO) or the contact’s physician.
- c. If contact is not able to obtain chemoprophylaxis prescription from their own physician, obtain the following information:
 - Client DOB
 - Weight (if a child)
 - Any allergies
 - Any medications they are taking
 - Pharmacy from our contract list where they would like to have the medication called in
- d. Provide this information to on call CMO in writing (use SIREN if by email). If needed, be ready to provide CMO with:
 - Phone number of the pharmacy
 - Information needed for billing (Bin #: 004428, PCN #: UDI, Group #: PCP, and member ID is first letter of first and last name followed by six digit date of birth.)
- e. CMO will call-in prescription to designated pharmacy and give you a prescription documenting this has been done. Document prescription in the PCHD Pharmacy Log.
- f. Assure that appropriate chemoprophylaxis was received by the contact(s). Refer to the *“Red Book: Report of the Committee on Infectious Diseases”*

- g. Initiate active surveillance of contacts for 10 days following last exposure to index case; if case is in child care or healthcare institution, follow contacts for two incubation periods (i.e. 20 days)

8. Environmental Measures: None.

9. Notifications

- a. Notify the CMO of reported case immediately.
- b. Notify ADHS within 24 hrs of reported case.

H. Outbreak Investigation:

1. Conduct case/contact investigation as indicated above.
2. Identify population(s) at risk of infection based on scope and spread of outbreak; use the information collected in case investigation to define:
 - Person: who is at risk or becoming ill (age, gender, occupations)
 - Place: where are cases or contacts and what settings or activities are they associated
 - Time: when did it start and is it still on-going (exposure and incubation periods)
3. Enhance surveillance of meningococcal invasive disease: Maintain active surveillance with close contacts for two incubation periods from last confirmed case (i.e. 20 days)
4. Consider mass immunization of students to prevent additional cases if an outbreak occurs and the serogroup is covered by the vaccine (i.e., A, C, Y, or W135).
5. Refer to *“Managing Special Situations”* for further guidance
6. Submit Outbreak Report Form to ADHS.

I. Managing Special Situations: Identify potential contacts to observe for symptoms and chemoprophylaxis, based on the following situations:

1. **School, preschool or child care settings:** General considerations -
 - a. Coordinate activities with school nurse and/or administration.
 - b. While the risk of transmission in a school is relatively low; the age of the case will determine the extent of chemoprophylaxis.
 - c. Daycare and preschool attendees are generally considered at higher risk for transmission due to the younger age of the children.
 - d. All children attending or visiting the facilities should be evaluated for at risk activities and interactions to determine the need for prophylaxis.
2. **Child care centers:**
 - a. With extensive contact between children, consider entire class (or entire center if the child care center is not divided into classes).
 - b. With minimum interaction between children, consider only individual(s) or groups with significant exposure.
3. **Home child care setting:** Consider all children, the child-care provider and members of his/her family who have had contact with case.
4. **Schools:** General considerations - patterns of interaction that increase the potential for sharing oral secretions among group members. Chemoprophylaxis groups with significant risk of exposure to the case’s oral secretions.
 - a. **Elementary school or middle school:** Consider contacts based on risk of direct contact with case’s oral secretions and the presence of activities that would allow for the exchange of oral secretions. Consider those who sit next to the case (school

- or transport), those sharing living arrangements, and the case's core group of close friends and social contacts. Casual contact with no history of direct exposure to index case's oral secretions is low risk and chemoprophylaxis is not recommended.
- b. **High school and other higher level education facilities:** Consider contacts based on risk of direct contact with case's oral secretions and the presence of activities that would allow for the exchange of oral secretions. Consider those who work closely with or sit next to the case (school or transport), those sharing living arrangements and the case's core group of close friends and social or work contacts.
- c. **Extra-curricular activities:** Other extra-curricular groups, including teams, are examined based on risk of group activities allowing for direct exchange of oral secretions. Direct exchange of oral secretions is allowed by sharing drinking cups or bottles, sharing eating utensils at a single setting, kissing, sharing cigarettes, or other markers of close social contact. Those inanimate objects not directly shared with contacts after being used by a case do not usually allow for this direct exchange of oral secretions. Exceptions are made for younger children who are more likely to have significant oral contact with toys and other inanimate objects.
- d. **Confirmed case(s) – School:**
- For classrooms, teams and other groups in which there are >2 confirmed cases, it may be appropriate to expand definition of a close contact (i.e. entire class, team or group who would not have been considered with only one confirmed case).
 - Providing chemoprophylaxis to an entire school or large child care center is not recommended under normal circumstances.
 - Create listing(s) of contacts organized by group setting. Evaluate extent of exposure for each group.
- e. **At-Risk Close Contacts – School:** For at-risk close contacts (those at risk for sharing oral secretions) perform the following:
- Evaluate for symptoms of meningitis and refer symptomatic contacts for medical treatment.
 - Refer asymptomatic contacts for chemoprophylaxis.
 - Notify parents of close contacts of the case (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.
 - As a case of invasive meningococcal illness in a school often causes panic in parents and in the community, discuss with the facility's administration if there is a need for and best way to provide additional information about meningococcal disease and its transmission.
 - Initiate active surveillance among close contacts and for at least 2 incubation periods (i.e., 20 days) after last case has been identified.
- f. **Case Attends College/University or Boarding School:** If a suspected or diagnosed case of meningococcal disease is reported on campus, the following intervention measures should be considered in consultation with Chief Medical Officer:

- Notify college administration and health care personnel.
- Intensify surveillance and increase awareness among college health services, community physicians, and hospitals.
- Begin education on college campus and in surrounding areas about transmission.
- Pursue early diagnosis and treatment of cases and contacts.
- Contacts of cases of meningococcal disease should receive appropriate antibiotic chemoprophylaxis whether or not they are vaccinated for meningococcal disease.
- Use the definition of high risk contacts under “Contact Investigation” when evaluating living situations and the need for prophylaxis.
- Consider mass immunization of students to prevent additional cases if an outbreak occurs and the serogroup is covered by the vaccine (i.e., A, C, Y, or W135).

J. Epidemiology: *Neisseria meningitidis* is a leading cause of bacterial meningitis in the United States. Disease incidence is highest in late winter to early spring. It is highest in children less than 5 years old, with a peak incidence in children under one year of age.

K. Disease Overview:

- 1. Agent:** *Neisseria meningitides* are gram-negative diplococcal bacteria. Serogroups A, B, C, Y, and W-135 cause almost all invasive disease worldwide. Among adolescents and adults, approximately two thirds of cases are caused by serogroups C, Y, or W-135, while in infants, approximately 50% of cases are caused by serogroup B. Serogroup A is rare in the United States.
- 2. Clinical Description:** Invasive meningococcal disease most commonly presents as meningitis, meningococcemia, or both. Symptoms of meningococcal meningitis include acute onset of fever, headache, and stiff neck, often accompanied by nausea, vomiting, photophobia, and altered mental status. Symptoms of meningococcemia (i.e., blood infection) include acute onset of fever often accompanied by hypotension and shock, and may include a petechial or purpuric rash, purpura fulminans, and multiorgan failure. *Neisseria meningitidis* also presents as pneumonia (5–15% of cases), arthritis (2%), and epiglottitis (< 1%). Up to 12% of infections are fatal, even with appropriate antibiotic treatment, and mortality in adolescents approaches 25% nationwide. Sequelae associated with meningococcal disease occur in as many as 20% of survivors and include hearing loss, neurologic disability, digit or limb amputations, and skin scarring. Asymptomatic colonization of the upper respiratory tract provides the source from which the organism is spread.

N. meningitidis organisms are carried in the nasopharynx of about 5–10% of the healthy population. Carrier rates of up to 25% have been documented in some groups in the absence of any cases of meningococcal disease. Less than 1% of those colonized develop invasive disease. Therefore, colonization is common, but invasive disease is very rare. The exact mechanism that allows the penetration of meningococci from the nasopharyngeal membranes into the blood is unknown, but a recent upper respiratory tract infection or exposure to smoke in one’s environment may facilitate invasion. Risk

groups for invasive meningococcal disease include infants and young children, household and other close contacts of infected persons, residents in congregate settings (e.g., military recruits, college students living in dormitories), and microbiologists working with isolates of *N. meningitidis*.

3. **Reservoirs:** Humans are the only reservoir.
4. **Modes of Transmission:** Transmission occurs through respiratory droplets or through direct contact with Nasopharyngeal and oral secretions from a colonized person – symptomatic or otherwise. Risk of disease in close contacts is highest during the 10-day period following exposure.
 5. **Incubation period:** 2 to 10 days, commonly 3 to 4 days.
6. **Period of Communicability:** Until live meningococci are no longer present in discharges from nose or mouth, usually 24 hrs after initiation of appropriate antimicrobial treatment. Contacts exposed to the patient more than 7 days before his/her onset of illness are not at significant increased risk.
 7. **Susceptibility and Resistance:** Susceptibility to the clinical disease is low and decreases with age; this introduces a high ratio of carriers to cases. Persons deficient in certain complement components are especially prone to recurrent disease; splenectomized persons are susceptible to bacteremic illness. Group-specific immunity of unknown duration follows even sub-clinical infections.
8. **Treatment:** Once microbiologic diagnosis is established, penicillin G is the drug of choice for patients diagnosed with invasive meningococcal disease, including meningitis. Cefotaxime, ceftriaxone, and ampicillin are acceptable alternatives.

L. Additional Information & References:

Treatment / Differential Diagnosis: American Academy of Pediatrics. 2009 Red Book: Section 3 Summaries of Infectious Diseases, Report of the Committee on Infectious Disease, 28th Ed. Illinois, Academy of Pediatrics, 2009: 455 - 463.

Epidemiology, Investigation and Control: Heymann. D., ed., Control of Communicable Diseases Manual, 19th Ed. Washington, DC, American Public Health Association, 2009: 415 - 420.

Arizona Regulations/Statutes Related to Infectious Disease, available at:

http://www.azsos.gov/public_services/Title_09/9-06.pdf

Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases. Available at:

<http://www.cdc.gov/vaccines/pubs/pinkbook/index.html>

Manual for the Surveillance of Vaccine-Preventable Diseases: Available at <http://www.cdc.gov/vaccines/pubs/surv-manual/default.htm> or

<http://www.cdc.gov/vaccines/pubs/surv-manual/default.htm> or <http://www.cdc.gov/vaccines/pubs/surv-manual/index.html>