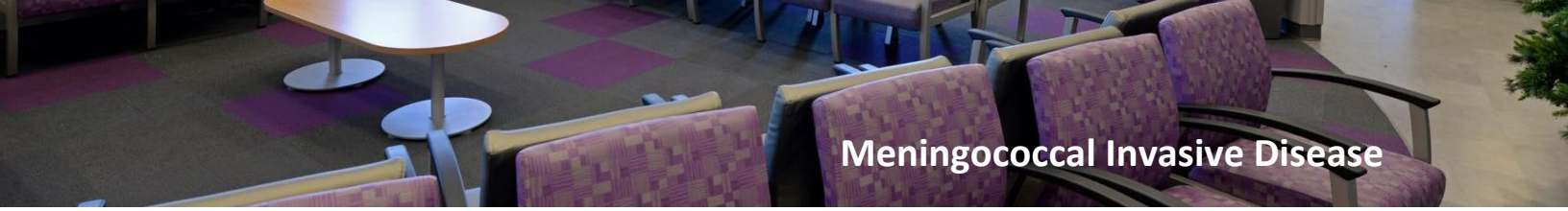

Meningococcal Invasive Disease

Invasive infections caused by *Neisseria meningitidis* are often severe and most commonly include meningitis or sepsis[1]. *N. meningitidis* is a primary cause of bacterial meningitis in the United States, and a cause of meningitis and sepsis epidemics in sub-Saharan Africa[1]. The majority of invasive disease is caused by the following five serogroups: A, B, C, Y and W-135[1]. The case fatality rate is as high as 15%, and 10–19% of survivors suffer long-term sequelae including digit or limb amputations, hearing loss, and neurologic disability[2].

A. Agent:
Neisseria meningitidis, a gram-negative diplococcus with at least 12 serogroups based on capsular size[2].

B. Clinical Description:
Meningitis is the most common manifestation of invasive meningococcal disease, and symptoms most commonly include sudden onset of fever, headache, nausea and vomiting, characteristic petechial rash, and stiff neck[3]. Meningococcemia is the most severe manifestation, with petechial rash, hypotension, shock, and multi-organ failure[3]. Less common clinical presentations include pneumonia, arthritis, and pericarditis[3].

C. Reservoirs:
Humans are the only natural reservoir of meningococcus. At any given time, about 10% of adolescents and adults are asymptomatic nasopharyngeal carriers of *N. meningitidis*. Many of these carried strains are nongroupable (not encapsulated) and unlikely to cause disease in most people[1].

D. Mode of Transmission:
Transmission occurs through direct contact with respiratory secretions. Up to 10% of people may be asymptomatic carriers with nasopharyngeal colonization[3]. Transmission occurs from person to person through droplets from the respiratory tract and requires close contact[2].

E. Incubation Period:
The incubation period for invasive disease is typically 3 to 4 days with a range of 1 to 10 days[1].

F. Period of Communicability:
Until live organisms are no longer present in discharges from the nose and mouth, organisms usually disappear from the nasopharynx within 24 hours of antimicrobial treatment[3].

G. Susceptibility and Resistance:
Certain persons are thought to be at increased risk including: Hajj pilgrims, military groups, individuals with underlying immune dysfunctions, and persons in any situation that would involve crowding, and active or passive exposure to tobacco smoke. Concurrent upper respiratory tract infection is thought to raise risk of invasive meningococcal disease[3].

Two doses of ACWY meningococcal conjugate vaccine (Menactra® or Menveo®) are recommended for all persons 11–12 years and a booster dose at 16 years[2].

Serogroup B meningococcal vaccine (Trumenba® or Bexsero®) is recommended for persons 10–25 years with increased risk, including persons with functional or anatomic asplenia, persons who take eculizumab (Soliris®), and persons with persistent complement component

deficiency[4]. In addition, serogroup B meningococcal vaccine may be given to anyone 16–23 years, preferably 16–18 years[4]. The same vaccine must be used for the entire series[4].

H. Treatment:
The following antibiotics are used in the treatment of invasive meningococcal disease: penicillin, ampicillin, ceftriaxone, and cefotaxime[3].

I. Clinical Case Definition[5]:
Meningococcal disease presents most commonly as meningitis and/or meningococcemia that may progress rapidly to purpura fulminans, shock, and death. However, other manifestations may be observed.

J. Laboratory Criteria for Diagnosis[5]:
Confirmatory Testing

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

Presumptive Testing

- Detection of *N. meningitidis* antigen in a formalin-fixed tissue by immunochemistry (IHC), or in CSF by latex agglutination.

Case Classification[5]	
Confirmed	A case that meets the confirmatory laboratory criteria for diagnosis.
Probable	A case that meets the presumptive laboratory criteria for diagnosis.
Suspect	● Clinical purpura fulminans in the absence of a positive blood culture, **OR** ● Gram-negative diplococci, not yet identified, isolated from a normally sterile site (e.g., blood or CSF).

K. Classification of Import Status:
N/A

L. Laboratory Testing[6]:
Invasive meningococcal disease is typically diagnosed by isolation or detection of *N. meningitidis* from a normally sterile site but may be initially suspected due to Gram staining. Isolates should be forwarded to the ASPHL for serogrouping.

M. Assessing Laboratory Results:
Isolation of *N. meningitidis* from a normally sterile site or detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile site (e.g., blood or CSF), using a validated polymerase chain reaction (PCR) assay is confirmatory for invasive meningococcal infection[5]. A Gram stain of CSF showing gram-negative diplococci is suggestive of meningococcal meningitis[1].

N. Outbreak Definition:
An outbreak is defined as ≥ 2 cases (epi-link outside household or common exposure source/ setting), occurring within a 10-day period (serogroup must be same if testing performed).

O. Time Frame[7]:

Providers	Submit a report to the Local Health Department by telephone or electronic reporting system authorized by ADHS within 24 hours after a case or suspect case is diagnosed, treated, or detected or an occurrence is detected.
Schools, Childcare establishments, Shelters	Submit a report to the Local Health Department within 24 hours after detecting a case or a suspect case.
Laboratories	- Submit a report to ADHS within 24 hours after obtaining a positive test result. - Submit an isolate or specimen, for each positive culture or test result, to ASPHL within 1 working day.
Local Health Agencies	- Notify ADHS within 24 hours after receiving a report. - Submit an epidemiologic investigation report to ADHS within 30 calendar days after receiving a report. - Ensure isolate or specimen, for each positive culture or test result, are submitted to ASPHL within 1 working day.

P. Forms:
- Meningococcal Invasive Disease Investigation Form

Q. Investigation Steps:
For a local health agency[7]:

A.A.C. .R9-6-362 . Meningococcal Invasive Disease
A. Case control measures:
1. A local health agency shall:
   a. Upon receiving a report under R9-6-202 or R9-6-203 of a meningococcal invasive disease case or suspect case, notify the Department within 24 hours after receiving the report and provide to the Department the information contained in the report;
   b. Conduct an epidemiologic investigation of each reported meningococcal invasive disease case or suspect case;
   c. For each meningococcal invasive disease case, submit to the Department, as specified in Table 2.4, the information required under R9-6-206(D); and
   d. In consultation with the Department, ensure that an isolate or a specimen, as available, from each meningococcal invasive disease case is submitted to the Arizona State Laboratory.

B. Contact control measures: A local health agency shall evaluate the level of risk of transmission from each contact's exposure to a meningococcal invasive disease case and, if indicated, provide or arrange for each contact to receive prophylaxis.

Confirm Diagnosis
- Before contacting the patient or family, determine what information is available from medical records, physician, etc.

- For hospitalization, obtain medical records, including admission notes, progress notes, lab report(s), and discharge summary.
- Obtain information that supports clinical findings in the case definition and information on the onset date, including:
  - Complications, hospitalizations, outcome status (survived or date of death).
- Obtain information on any laboratory tests performed and results or date results are expected.
- Obtain accurate and complete immunization histories on cases. Collect vaccine information, including:
  - Dates of vaccination, type, vaccine lot number, manufacturer, number of doses, and why case was not vaccinated (if applicable).

Conduct Case Investigation

- Epidemiological investigation report should be submitted in MEDSIS by filling out the full DSO.
- Identify potential source of infection; focus on incubation period of 2–10 days prior to onset.
- Obtain information on any laboratory tests performed and results.
  - If *N. meningitidis* was isolated from clinical specimen, ensure isolate was sent to the Arizona State Public Health Laboratory.
- Travel history should be captured in the travel table in MEDSIS including dates of travel.

Conduct Contact Investigation

- Conduct contact investigation to locate additional cases and/or close contacts.
- Close (high risk) contacts are household members/roommates, child care center contacts, and any persons directly exposed to the patient's oral secretions (e.g., kissing, sharing utensils, etc.) in the 7 days before onset[1, 2].
- Determine if case is involved in a high-risk occupation (e.g., child care) or if another special situation is involved (e.g., college, residential facility, health care, etc.) to locate additional cases and/or close contacts.
- Refer to the "Red Book: Report of the Committee on Infectious Diseases".

Initiate Control and Prevention Measures

- Chemoprophylaxis should be administered to close contacts within 24 hours of identification of the index case[1, 2].
  - There is little value if chemoprophylaxis is administered 14 days after exposure[1, 2].
- Provide contacts 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.

Isolation, Work and Child Care Restrictions

For a health care provider or an administrator of a healthcare institution[7]:

A.A.C. R9-6-362 . Meningococcal Invasive Disease

A. Case control measures:

1. A diagnosing health care provider or an administrator of a health care institution, either personally or through a representative, shall isolate and institute droplet precautions for a meningococcal invasive disease case for 24 hours after the initiation of treatment.

Case Management

Ensure that appropriate treatment was received by the case(s).

- Refer to the “Red Book: Report of the Committee on Infectious Diseases”.

Contact Management, including Susceptible Contacts

- Ensure that appropriate chemoprophylaxis was received by the contact(s).
  - Refer to the “Red Book: Report of the Committee on Infectious Diseases”.
- Decisions about providing chemoprophylaxis for contacts should be made in consultation with the contact’s provider, if possible.
- If contact is not able to obtain chemoprophylaxis prescription, it is recommended for the local health department to arrange to provide a prescription for contact.
- Initiate active surveillance of contacts for 10 days following their last exposure to the index case.

Notifications

- As appropriate, use the notification letter(s) and the disease fact sheet to notify the case, contacts and other individuals or groups.
- ADHS is responsible for notifying CDC upon identification of a confirmed/probable case.
- ADHS is responsible for submitting information from the investigation form to CDC.

R. Outbreak Guidelines:

Refer to the general outbreak guidelines section for general information on conducting an outbreak investigation.

References

1. Meningococcal disease [Internet]. Centers for Disease Control and Prevention. The Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases; 2015. Available from: https://www.cdc.gov/pinkbook/hcp/table-of-contents/chapter-14-meningococcal-disease.html?CDC_AAref_Val=https://www.cdc.gov/vaccines/pubs/pinkbook/mening.html

2. American Academy of Pediatrics. 2021 Red Book: Report of the Committee on Infectious Disease, 32nd Edition. Illinois, Academy of Pediatrics, 2021.

3. Heymann DL. Meningococcal Meningitis. In: Control of communicable diseases manual. Washington, DC: American Public Health Association; 2015. P. 404–408.

4. Meningococcal ACIP Vaccine Recommendations [Internet]. Centers for Disease Control and Prevention. ACIP Vaccine Recommendations and Guidelines. [cited 2022February15]. Available from: https://www.cdc.gov/acip-recs/hcp/vaccine-specific/meningococcal.html?CDC_AAref_Val=https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html

5. Case Definitions for Communicable Morbidities [Internet]. Arizona Department of Health Services; 2022 [cited 2022Feb23]. Available from: https://www.azdhs.gov/preparedness/epidemiology-disease-control/index.php#investigations-case-definition

6. Arizona Department of Health Services. Bacteriology. In: Microbiology Lab Guide: 2019 [cited 2022Mar11]. Available from: http://www.azdhs.gov/documents/preparedness/state-laboratory/public-health-microbiology/lab-guide.pdf

7. Arizona Administrative Code. 2021Sep30 [cited 2022February15]; Available from: http://apps.azsos.gov/public_services/Title_09/9–06.pdf