

Section 10: Meningococcal Disease, Invasive

BASIC EPIDEMIOLOGY

Infectious Agent

Neisseria Meningitis (*N. meningitidis*) is a gram-negative, aerobic diplococcus with at least 14 serogroups. Serogroups A, B, C, Y, W-135 and X are all capable of causing outbreaks. In the United States, B, C and Y are the most common.

Transmission

N. meningitis spreads from person to person either by direct contact with respiratory secretions (e.g. kissing), indirect contact (e.g. sharing of eating utensils), or by aerosol droplets (e.g. coughing and sneezing). Up to 10-20% of people can be asymptomatic nasopharyngeal carriers of *N. Meningitis*. Less than 1% of those will progress to invasive disease.

Incubation Period

The incubation period is usually 3 to 4 days, but it can range from 1-10 days

Communicability

A person can pass the infection to others for as long as the bacteria are present in discharges from the nose and mouth. A person is no longer infectious within 24 to 48 hours after starting appropriate antimicrobial treatment.

Clinical Illness

- **Meningitis** is the most common presentation of invasive meningococcal disease. Meningococcal infection is similar to other forms of meningitis, with sudden onset of fever, headache, and stiff neck, often accompanied by nausea, vomiting, photophobia (sensitivity to light), or altered mental status.
- **Meningococcal sepsis (meningococcemia or bacteremia)** is the most severe form and can occur without meningitis in 5-20% of invasive infections. Sepsis is characterized by abrupt onset of fever and a petechial or purpuric (red or purplish spots caused by bleeding under the skin) rash, and is often associated with hypotension, shock, acute adrenal hemorrhage, and multiorgan failure.
- Less common presentations of meningococcal disease include pneumonia, arthritis, otitis media, and epiglottitis.

Severity

Case fatality rate is 8%-15% even with appropriate antibiotic treatment. Furthermore, sequelae occur in 11-19% of people and may include hearing loss, neurologic disability, amputation or loss of limb use.

DEFINITIONS

Clinical Case Definition

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.

Laboratory Confirmation

A clinically compatible case that meets at least one of the confirmatory laboratory criteria

- Isolation of *Neisseria meningitidis* from a normally sterile site
- Isolation of *Neisseria meningitidis* from purpuric lesions

Note: All *Neisseria meningitidis* isolates from normally sterile sites and/or purpuric lesions must be submitted to the DSHS laboratory for typing and molecular analysis.

Case Classifications

- **Confirmed:** A clinically compatible case that is laboratory confirmed
- **Probable:** A clinically compatible case that has one of the following:
 - *N. meningitidis* nucleic acid detected using a validated polymerase chain reaction (PCR), obtained from a normally sterile site; or
 - *N. meningitidis* antigen by immunohistochemistry (IHC) on formalin-fixed tissue; or
 - *N. meningitidis* antigen by latex agglutination of CSF; or
 - Clinical purpura fulminans in the absence of a positive blood culture; or
 - Clinically compatible case with gram negative diplococci from a normally sterile site (e.g., blood or CSF)

Cluster and Outbreak Definitions

- Cluster:
 - Two or more cases with matching PFGE patterns in 1 county in a 1 year period OR
 - 2 or more cases with matching PFGE patterns anywhere in a 3 month period OR
 - any investigation of multiple cases that resulted in threshold calculations
- Outbreak:
 - Occurrence of three or more confirmed or probable cases of meningococcal disease during a period of less than 3 months with the resulting primary attack rate of at least 10 cases per 100,000 population.

CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of invasive meningococcal infections. Investigations should include an interview of the case or a surrogate to get a detailed

exposure history. Please use the Meningococcal Infection Investigation Form available on the DSHS website: <http://www.dshs.state.tx.us/idcu/investigation/>

Case Investigation Checklist

- Confirm laboratory results meet the case definition. Identification of gram negative diplococci from a sterile site (e.g. blood or CSF) or from purpuric lesions is sufficient to initiate an investigation and warrant prophylaxis of close contacts.
 - See the Sterile Site and Invasive Disease Determination Flowchart for confirming a specimen meets the criteria for sterile site.
- Verify that the laboratory has forwarded the isolate to the DSHS laboratory for typing and molecular analysis. If an isolate is not available but *Neisseria meningitidis* is suspected, forward any specimen that is available.
- Review medical records or speak to an infection preventionist or physician to verify demographics, symptoms, underlying health conditions, and course of illness.
- Complete the Meningococcal Infection Investigation Form by interviewing the case (or surrogate) to identify close contacts, risk factors and other pertinent information.
 - When possible, obtain detailed information on close contacts, including address, place of work, occupation, and daycare or school information.
 - If needed, the Respiratory Contact Tracking Form may be used to document contacts.
- Ensure appropriate control measures are implemented (see control measures below).
- Refer close contacts to healthcare providers for appropriate chemoprophylaxis
- If applicable, complete steps in the Managing Special Situations section.
- Complete the Meningococcal Infection Investigation Form and fax it to DSHS.
- All probable and confirmed meningococcal case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules (https://txnedss.dshs.state.tx.us:8009/PHINDox/UserResources/Data_Entry_Guidelines_2007.pdf).
- In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS IDCU.

Control Measures

Cases

- Investigate reports of suspected meningococcal disease promptly to identify at risk contacts.
- Treatment should be started immediately upon diagnosis.
- Respiratory isolation of patients for 24 hours after start of appropriate chemotherapy.
- Any clothing or bedding that is soiled from nose or throat discharges should be disinfected. A patient's hospital room should be terminally cleaned upon discharge.

Contacts

- Advise contacts of signs and symptoms of illness, and refer them to their health care providers if they experience any symptoms compatible with invasive meningococcal disease.
- Provide close contacts with a Meningococcal Meningitis fact sheet.

- A fact sheet is available on the IDCU (Infectious Disease Control Unit) web site: http://www.dshs.state.tx.us/idcu/disease/meningococcal_invasive/faqs/
- Prophylaxis should be given to household members, people sharing sleeping quarters with the case (e.g. military barracks, same bedroom, etc), and anyone that is a close enough contact to have shared eating utensils within 2 weeks of exposure. Guidance for identification of and prophylaxis of contacts can be found in the Red Book.
- Close contacts should be monitored for signs of illness, especially fever, for up to ten days.
- Hospital personnel only need prophylaxis if they are directly exposed to the patient's nasal or throat secretions and failed to wear appropriate PPE.

General Public

- There is a vaccine that offers protection against 4 out of the 5 serogroups of *N. meningitidis*. The meningococcal conjugate (Menactra® and Menveo®) and polysaccharide (Menomune®) vaccines are available in the USA. For more information about vaccine call the Immunization Division at 1-512-776-7284.
- Routine hand washing and practicing respiratory etiquette (e.g. covering mouth and nose while sneezing or coughing) is essential to prevent spread of bacteria.
- Limit sharing food, eating utensils, and other personal belongings.

Close contacts definition: any member of the case's household or other individual who may have had direct contact with the case's saliva or oral/nasal secretion. Healthcare providers who have direct contact with the case's oral/nasal secretions (e.g. unprotected mouth-to-mouth resuscitation, intubation, or suctioning) are also considered close contacts. See the Red Book for more information on determining close contacts.

Exclusion

Children with a fever from any infectious cause should be excluded from school/daycare for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Children with meningococcal meningitis should be excluded from school/daycare until written permission is provided by their healthcare provider.

MANAGING SPECIAL SITUATIONS

Cases Associated with a School or Daycare

If multiple cases occur among children/students and/or staff at a school or daycare immediately notify the Infectious Disease Control Unit (IDCU) at (800) 252-8239 or (512) 776-7676.

The local / regional health department should

- Investigate links between the cases.
- Recommend basic control measures including hand hygiene / respiratory etiquette education.
- Calculate attack rates for the school / daycare by classroom, grade or other grouping. (Attack rate is number of ill people divided by total number of exposed people).

- Conduct surveillance for new cases of disease for a minimum of two weeks after the onset of the last case.

Multiple Cases Located in one Community (school district, zip code, city, county)

If multiple cases occur within a community (school district, zip code, city, county) notify the Infectious Disease Control Unit (IDCU) at (800) 252-8239 or (512) 776-7676.

The local / regional health department should:

- Determine the population of the community and perform epidemic threshold calculations as described in the Control of Communicable Diseases
 - Alert threshold is 10 cases/100000 population
 - Epidemic threshold is: a weekly doubling of cases during a three week period or 15 cases/100000 population or 2 cases at a mass gathering or among refugees or displaced person.
- If at least 3 cases occur in a three month period AND the alert threshold is met then active surveillance to detect other cases in the population should be conducted.
 - If the strain is covered by the vaccine then immunization of unvaccinated members of the at-risk population may be considered
- If the epidemic threshold is exceeded and if the cases are predominantly a strain that is vaccine preventable (serogroup A, C, Y or W-135), then
 - conduct a public education campaign and
 - coordinate a mass vaccination campaign for the affected community
- Note: Mass chemoprophylaxis is not usually effective for widespread communities but may be considered for small sub-populations (e.g. schools) that are directly experiencing cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements

According to Texas Administrative Code meningococcal infection should be reported immediately by phone to the local health authority or the DSHS regional director or to the Texas Department of State Health Services (DSHS) Infectious Disease Control Unit (IDCU) at (800) 252-8239 or (512) 512-7676.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should

- Immediately investigate any reported cases of invasive meningococcal disease.
- Identify and evaluate close contacts.
- Implement control measures and provide education to prevent further spread of disease.
- fax (or mail) a completed investigation form on all confirmed and probable cases within 30 days of notification.
 - Investigations forms may be faxed to 512-776-7616 or mailed to:
 Infectious Disease Control Unit
 Texas Department of State Health Services

Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

- Enter case into NBS and submit an NBS notification on all confirmed and probable cases to DSHS within 30 days of receiving a report of confirmed/probable cases of meningococcal infections. Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules (https://txnedss.dshs.state.tx.us:8009/PHINDox/UserResources/Data_Entry_Guidelines_2007.pdf).

When an outbreak is investigated, local and regional health departments should:

- Report suspected outbreaks within 24 hours of identification to the regional DSHS office or to the Infectious Disease Control Unit 512-776-7676 and
- Submit a completed Respiratory Disease Outbreak Summary Form at the conclusion of the outbreak investigation (fax a copy to the DSHS regional office and/or IDCU 512-776-7676)

LABORATORY PROCEDURES

Neisseria meningitidis isolates from normally sterile site and/or purpuric lesions are required by law to be submitted to the DSHS Laboratory for typing and molecular analysis. To obtain testing kits, contact the DSHS Laboratory at (512) 776-7661. Before shipping specimens, be sure to notify DSHS IDCU staff at (512) 776-7676.

Specimen Collection

- Submit isolates of *N. meningitidis* on blood or chocolate agar at ambient temperature.
- Submit blood in a red or tiger-top vacutainer. Transport at ambient temperature.
- Submit spinal fluid. Transport at room temperature. DO NOT REFRIGERATE.

Laboratory Submission Form

- Use DSHS Laboratory G-2B Submission Form.

Specimen Shipping

- DO NOT ship specimens on a Friday or the day before a state holiday unless special arrangements have been pre-arranged with the DSHS Laboratory.
- *N. meningitidis* is considered an infectious agent, biosafety level 2. The isolate should be triple contained in accordance with federal regulations.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Frequent Causes for Rejection:

- Discrepancy between name on tube and name on form.
- Expired media used.