MENINGOCOCCAL DISEASE
(Meningococcal Meningitis, Meningococcemia)

REPORTING INFORMATION

- **Class A:** *Report immediately via telephone* the case or suspected case and/or a positive laboratory result to the local public health department where the patient resides. If patient residence is unknown, report immediately via telephone to the local public health department in which the reporting health care provider or laboratory is located.
- Reporting Form(s) and/or Mechanism: *Immediately via telephone.*
- CDC National Bacterial Meningitis and Bacteremia Case Report (form 52.15, rev. 10/91) is available for use to assist in local health department disease investigation and contact tracing activities. Information collected from the form should be entered into the Ohio Disease Reporting System (ODRS) and not sent to the Ohio Department of Health (ODH), unless otherwise requested.
- Additional reporting information, with specifics regarding the key fields for ODRS reporting can be located in Section 7.

AGENT

Neisseria meningitidis is a Gram-negative diplococcus bacterium with multiple serogroups known to cause invasive disease (e.g. A, B, C, X, Y, W-135). Serogroups B, C and Y are the most prevalent in Ohio. Group A has frequently been associated with epidemics in other parts of the world.

CASE DEFINITION

Case Classification

Suspect:

- Clinical purpura fulminans in the absence of a positive blood culture or
- Gram-negative diplococci, not yet identified, from a normally sterile body site (e.g. blood, cerebrospinal fluid [CSF]).

Probable:

- Detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g. blood, CSF) using a validated polymerase chain reaction (PCR) assay or
- Detection of *N. meningitidis* antigen in formalin-fixed tissue by immunohistochemistry (ICH) or in CSF by latex agglutination.

Confirmed: Isolation of *N. meningitidis* from a normally sterile body site (e.g. blood, CSF or less commonly, synovial, pleural or pericardial fluid) or from purpuric lesions.

Not a Case: This status will not generally be used when reporting a case, but may be used to reclassify a report if investigation revealed that it was not a case or if *N. meningitidis* was identified from a non-normally sterile site.

SIGNS AND SYMPTOMS

Invasive meningococcal infection usually results in meningococcemia and/or meningitis. Onset is abrupt in meningococcemia with fever, chills, malaise, myalgia, limb pain, prostration and a rash which can be urticarial, maculopapular or petechial.

The progression of disease is usually rapid. In fulminant cases, purpura, limb ischemia, coagulopathy, pulmonary edema, disseminated intravascular coagulation (DIC), shock, coma and death can ensue within several hours despite appropriate therapy. Meningitis presents with altered mental status, seizures in some patients and meningeal irritation. Individual symptoms vary widely from patient to patient; infants and small children may exhibit only fever and vomiting. The classical symptoms of headache, stiff neck and confusion occur in less than half of patients. Invasive meningococcal infections may be complicated by arthritis, myocarditis, pericarditis, endophthalmitis or pneumonia.

DIAGNOSIS

Gram-stained smear from a normally sterile body site showing Gram-negative diplococci raises suspicion of invasive meningococcal disease. Diagnosis is confirmed by a culture of the blood and/or spinal fluid. Clinical laboratories should send all *N. meningitidis* isolates from normally sterile sites to the ODH Laboratory for serogroup analysis. Presumptive evidence of invasive meningococcal disease can be obtained with PCR or antigen testing from a normally sterile body site.

Positive antigen test results from urine or serum samples are unreliable for diagnosis of meningococcal disease. These results should not be reported. Further testing from a normally sterile site is necessary for diagnosis of invasive *N. meningitidis*.

EPIDEMIOLOGY

Source

The upper respiratory tract of humans. Asymptomatic colonization is frequent and provides the focus from which the organism is spread. It is estimated that 5% - 25% of a population are asymptomatic carriers.

Occurrence

Peak attack rates used to be in children between 3-5 months of age with the greatest percentage of cases in children <5 years of age before the availability of vaccine. Child care centers, preschools and military camps experience the majority of outbreaks. Pre-teens, adolescents, college freshmen who live in dorms and travelers to countries where meningitis is always present are at an increased risk.

Mode of Transmission

Person-to-person through droplets of infected respiratory secretions.

Period of Communicability

The exact period of communicability is unknown, but is probably throughout the duration of the presence of the organism in the upper respiratory tract of those with invasive disease and in contacts who have become asymptomatically colonized with meningococci.

Incubation Period

2-10 days, most commonly 3-4 days.

PUBLIC HEALTH MANAGEMENT

Case

Treatment

Hospitalization is usually required for parenteral antibiotic treatment and vigorous supportive care. Treatment for invasive disease does not eliminate nasopharyngeal carriage of the organism in the index case. It is imperative that carriage of the organism be eradicated before the patient is discharged from the hospital by administering rifampin in the same dosage as noted below.

Isolation

The Ohio Administrative Code (section 3701-3-13, (O)) states that "a person with meningococcal disease shall be isolated until twenty-four hours after the initiation of effective antimicrobial therapy." This includes droplet precautions for 24 hours in hospitalization.

Contacts

Investigation

Identification of contacts is important to determine those requiring chemoprophylaxis. **High-risk** contacts for whom chemoprophylaxis is recommended include:

- Household contacts, especially young children less than 2 years old,
- Child care, nursery school and babysitting contacts in the previous 7 days before onset of illness,
- Anyone who had direct contact with the case's oral secretions through kissing or sharing toothbrushes or eating utensils any time during 7 days before onset of illness,
- Anyone who performed mouth-to-mouth resuscitation on or was unprotected during oral intubation of the case any time during 7 days before onset of illness,
- Anyone who frequently sleeps or eats in the same dwelling as the case 7 days before onset of illness and
- Passengers seated directly next to case during airline flights lasting more than 8 hours.

Low-risk contacts for whom chemoprophylaxis is not recommended include:

- Persons having only casual contact with the case and no direct contact with oral secretions (e.g. school or work mates),
- Persons who had contact only with a high-risk contact (i.e., no direct contact with the case) and
- Health care personnel who did not have contact with the case's oral secretions.

Prophylaxis

All household and child care or preschool contacts should receive prophylaxis, preferably within 24 hours of diagnosis of the index case. Nasopharyngeal cultures are not recommended for screening contacts. They are of no value in making decisions related to prophylaxis.

Rifampin, ceftriaxone and ciprofloxacin are equally effective for prophylaxis. The drug of choice for most children is rifampin. Another appropriate drug is azithromycin:

- Rifampin is administered twice daily for two days: adults 600 mg per dose;

children >1 month of age, 10 mg/kg (maximum 600mg); and children <1 month of age 5 mg/kg. Rifampin is not recommended for pregnant women.
- Ceftriaxone is administered IM in a single dose: adults 250 mg; children <15 years of age 125 mg.
- Ciprofloxacin given to adults in a single oral dose of 500 mg is also effective in eradicating meningococcal carriage. Presently, ciprofloxacin is not recommended for persons younger than 18 years of age or for pregnant women.
- Azithromycin -Not routinely recommended -10mg/kg (maximum 500mg).

Prophylaxis is not completely effective and exposed contacts should remain under medical supervision for one month.

Prevention and Control

Two quadrivalent (A, C, Y and W-135) vaccine formulations are currently available in the United States. Vaccine is indicated to control outbreaks of disease proven to be caused by one of the serogroups represented in the vaccine. In an outbreak, the serogroup should be determined and the population at risk delineated by neighborhood, school, dormitory or other reasonable boundary. Although endemic disease is very uncommon above age five years, older children, adolescents and young adults constitute a higher proportion of cases during epidemics and may warrant vaccination during an outbreak.
(Contact the ODH Immunization Program at (614) 466-4643 if two or more cases occur within two weeks of each other within a county or nearby communities.)

- Meningococcal Conjugate Vaccine (MCV4) is licensed for persons 2-55 years of age. It is recommended by the Advisory Committee for Immunization Practices (ACIP) for routine vaccination of young adolescents (11-12 years of age) at the preadolescent health care visit, before high school entry (approx. age 15), for those adolescents who have not previously received MCV4, for other adolescents who wish to decrease their risk for meningococcal disease and for anyone who is at increased risk for disease. Groups that have an elevated risk of meningococcal disease include:
  - Individuals with terminal complement component or properdin deficiencies,
  - Persons with anatomic or functional asplenia,
  - Persons with HIV infection,
  - Military recruits,
  - College freshmen living in dormitories,
  - Microbiologists who are routinely exposed to isolates of *N. meningitidis* and
  - Persons who travel to or reside in countries in which *N. meningitidis* is hyperendemic or epidemic, particularly if contact with the local population will be prolonged.

ACIP recommended in 2010 that adolescents receive a booster dose at age 16 if they received a first dose at 11-12 years old. Persons receiving first dose at age 13-15 years should receive a booster dose at age 16-18 years.

- Meningococcal Polysaccharide Vaccine (MPSV4) is recommended for individuals over 55 years who are at high risk. See MCV4 recommendations for a list of groups at elevated risk.

- For specific vaccine information see the ODH Vaccine Protocol Manual.

Ohio College Requirement: The Ohio Revised Code (ORC) Section 1713.55 states that beginning with the academic year that commences on or after July 1, 2005, an institution of higher education shall not permit a student to reside in on-campus housing unless the student (or the student's parent if the student is younger than 18 years of age) discloses whether the student has been vaccinated against meningococcal disease and hepatitis B by submitting a meningitis and hepatitis B vaccination status statement. The student is NOT required to have the vaccinations, just disclose whether they have or not.

What is meningitis?
Meningitis is an infection of the fluid of a person's spinal cord and the fluid that surrounds the brain. People sometimes refer to it as spinal meningitis. Meningitis is usually caused by a viral or bacterial infection. Knowing whether meningitis is caused by a virus or bacterium is important because the severity of illness and the treatment differ. Viral meningitis is generally less severe and resolves without specific treatment while bacterial meningitis can be quite severe and may result in brain damage, hearing loss or learning disability. For bacterial meningitis, it is also important to know which type of bacteria is causing the meningitis because antibiotics can prevent some types from spreading and infecting other people. Before the 1990s, *Haemophilus influenzae* type b (Hib) was the leading cause of bacterial meningitis, but new vaccines being given to all children as part of their routine immunizations have reduced the occurrence of invasive disease due to *H. influenzae*. Today, *Streptococcus pneumoniae* and *Neisseria meningitidis* are the leading causes of bacterial meningitis.

What are the signs and symptoms of meningitis?
High fever, headache and stiff neck are common symptoms of meningitis in anyone over the age of 2 years. These symptoms can develop over several hours, or they may take 1 to 2 days. Other symptoms may include nausea, vomiting, discomfort looking into bright lights, confusion and sleepiness. In newborns and small infants, the classic symptoms of fever, headache and neck stiffness may be absent or difficult to detect, and the infant may only appear slow or inactive, be irritable, have vomiting or be feeding poorly. As the disease progresses, patients of any age may have seizures.

How is meningitis diagnosed?
Early diagnosis and treatment are very important. If symptoms occur, the patient should see a doctor immediately. The diagnosis is usually made by growing bacteria from a sample of spinal fluid. The spinal fluid is obtained by performing a spinal tap, in which a needle is inserted into an area in the lower back where fluid in the spinal canal is readily accessible. Identification of the type of bacteria responsible is important for selection of correct antibiotics.

Can meningitis be treated?
Bacterial meningitis can be treated with a number of effective antibiotics. It is important, however, that treatment be started early in the course of the disease. Appropriate antibiotic treatment of most common types of bacterial meningitis should reduce the risk of dying from meningitis to below 15%, although the risk is higher among the elderly.

Is meningitis contagious?
Yes, some forms of bacterial meningitis are contagious. The bacteria are spread through the exchange of respiratory and throat secretions (i.e., coughing, kissing). Fortunately, none of the bacteria that cause meningitis are as contagious as things like the common cold or the flu, and they are not spread by casual contact or by simply breathing the air where a person with meningitis has been.

However, sometimes the bacteria that cause meningitis have spread to other people who have had close or prolonged contact with a patient with meningitis caused by *Neisseria meningitidis* (also called meningococcal meningitis) or Hib. People in the same household or day care center, or anyone with direct contact with a patient's oral secretions (such as a boyfriend or girlfriend) would be considered at increased risk for acquiring the infection. People who qualify as close contacts of a person with meningitis caused by *N. meningitidis* should receive antibiotics to prevent them from getting the disease.

Are there vaccines against meningitis?
Yes, there are vaccines against Hib, against some serogroups of *N. meningitidis* and many types of *Streptococcus pneumoniae*.

There are two vaccines against *N. meningitidis* available in the U.S. Meningococcal polysaccharide vaccine (MPSV4) has been approved by the Food and Drug Administration (FDA) and available since 1981. Meningococcal conjugate vaccine (MCV4) was licensed in 2005 and 2010. Both vaccines can prevent 4 types of meningococcal disease, including 2 of the 3 types most common in the U.S. (serogroup C, Y, and W-135) and a type that causes epidemics in Africa (serogroup A). Meningococcal vaccines cannot prevent all types of the disease. But they do protect many people who might become sick if they didn't get the vaccine. Meningitis cases should be reported to state or local health departments to assure follow-up of close contacts and recognize outbreaks.

MCV4 is recommended for all children at their routine preadolescent visit (11 to 12 years of age). For those who have never gotten MCV4 previously, a dose is recommended at high school entry. Other adolescents who want to decrease their risk of meningococcal disease can also get the vaccine. Other people at increased risk for whom routine vaccination is recommended are college freshmen living in dormitories, microbiologists who are routinely exposed to meningococcal bacteria, U.S. military recruits, anyone who has a damaged spleen or whose spleen has been removed; anyone who has terminal complement component deficiency (an immune system disorder), anyone who is traveling to the countries which have an outbreak of meningococcal disease and those who might have been exposed to meningitis during an outbreak. MCV4 is the preferred vaccine for people 2 to 55 years of age in these risk groups, but MPSV4 can be used if MCV4 is not available. MPSV4 should be used for adults over 55 who are at risk.