KEY FACTS

Disease
Invasive disease most commonly is manifest by meningitis and/or sepsis.

Pathogen
*Neisseria meningitidis* (a Gram-negative aerobic diplococcus)

Reservoir
Humans.

Mode Of Transmission
Person-to-person via droplet.

Incubation Period
3-4 days (range, 2-10 days).

Period Of Communicability
Until pathogen is absent from nasal secretions (24 hours after appropriate antibacterial therapy).

Infectivity
High with prolonged close contact (e.g., family members); low for healthcare workers

Pre-Exposure Prophylaxis
Polysaccharide vaccine (A, C, Y, W135)

Post-Exposure Prophylaxis
Antibiotics (vaccine may also be indicated in outbreak situations – provide only at direction of Orange County Health Department, Occupational Health, or Hospital Epidemiology)

Remove from work following exposure
No

Remove from work if infected
Yes till properly treated for 24 hours and well enough to work.

PLEASE NOTIFY HOSPITAL EPIDEMIOLOGY IMMEDIATELY OF ANY KNOWN OR SUSPECTED CASES OF INVASIVE MENINGOCOCCAL INFECTION
(6-1638 during normal working hours or 216-6652 on nights and weekends)

ETIOLOGIC AGENT

*Neisseria meningitidis* is a Gram-negative aerobic diplococcus. Infection is usually diagnosed by isolating the pathogen from blood or CSF. It may be identified in tissue samples (e.g., skin biopsy) or body fluids (e.g., CSF, blood) by its characteristic Gram-stain appearance (Gram negative diplococci) although *N. gonorrhoeae* has an identical appearance. The frequency of positive cultures if obtained prior to antibiotics is as follows: CSF 80 to 90 percent and blood 50 to 60 percent. Antibiotic administration will prevent positive cultures from being obtained from CSF as rapidly as 15 minutes and all cultures obtained after 2 hours will likely be negative. *Neisseria meningitidis* may also be identified by Latex agglutination (CSF, urine) and PCR (CSF, blood).

EPIDEMIOLOGY

*Neisseria meningitidis* is found only in humans. Six serotypes exist: A, B, C, Y, W135, and X. Over 90% of disease is caused by serotypes B (35%), C (32%) and Y (26%) of. However, the
incidence of disease due to serotypes Y and W135 is increasing. Outbreaks are frequent, particularly in communities with crowding and stress such as families, military barracks, college dormitories, prisons, and day care centers. Certain areas of the World (e.g., meningitis belt across sub-Saharan Africa) have higher rates of disease. Laboratory workers who centrifuge CSF samples without following proper isolation precautions may acquire disease. In the U.S., most outbreaks occur in the late winter to early spring.

*Neisseria meningitidis* infections may occur at any age group but infants (3-12 months) have the highest incidence. Late terminal complement deficiencies (C5-C9) are a major predisposing factor for isolated infections including meningitis and sepsis. Importantly, 5-10% of people may harbor strains of *Neisseria meningitidis*, especially during winter months. Less than 1% of persons harboring strains of *Neisseria meningitidis* develop invasive disease. In the absence of exposure to a person with invasive meningococcal infection, persons with pharyngeal colonization do not require antibiotic therapy.

*Neisseria meningitidis* is transmitted by large droplets that are dispelled within a ≤3 feet perimeter of an infected person. Contact with saliva or respiratory secretions is required for transmission. For case definition of Meningococcal Disease (*Neisseria meningitides*), invasive see appendix #1.

**CLINICAL ILLNESSES**

*Neisseria meningitidis* meningitis classically is characterized by sudden onset, high fever, severe headache, stiff neck, photophobia, and mental confusion. Other symptoms may include nausea and vomiting. *Neisseria meningitidis* sepsis may accompany meningitis or occur in the absence of meningitis. It is characterized by high fever, prostration, low blood pressure, DIC, and a petechial skin rash that may progress to purpura. Mortality of meningococcal meningitis with proper therapy is ~5-15%. As the disease progresses, patients at any age may have seizures or other neurological sequelae which may include permanent hearing loss, or mental retardation.

**ISOLATION PRECAUTIONS**

Patients with known or suspected invasive infections with *Neisseria meningitidis* should be placed on Droplet Precautions (private room, mask for healthcare workers when entering the room). Precautions may be discontinued 24 hours after initiation of proper therapy. Infected patients should receive therapy to eliminate colonization prior to discharge.

**PRE-EXPOSURE PROPHYLAXIS**

Pre-exposure prophylaxis is available in the U.S. with the quadrivalent polysaccharide vaccine (contains serotypes A, C, Y, W135). There are two vaccines against *N. meningitidis* available in the U.S. Meningococcal polysaccharide vaccine (MPSV4 or Medomune) has been approved by the FDA since 1981. Meningococcal conjugate vaccine (MCV4or MenactraT) was licensed in 2005. MCV4 is recommended for all children at their routine preadolescent visit (11-12yrs of age) and is the preferred vaccine for people 11 to 55 years of age in the recognized risk groups, but MPSV4 can be used if MCV4 is not available. MPSV4 should be used for children 2 to 10 years old, and adults over 55, who are at risk. The ACIP recommends vaccine be provided to the following high risk groups: college student living in dormitories, travelers to countries with infections with *Neisseria meningitidis* are endemic, Hajj pilgrims, military recruits, persons with certain underlying immune dysfunction (late terminal complement deficiency, functional asplenia) and microbiologists who are routinely exposed to meningococcal bacteria spinning cerebral spinal fluid. Vaccine may be indicated for control of outbreaks. Reimmunization may be indicated after 5 years if vaccine indications persist. The same guidelines for vaccination apply to pregnant women.
POST-EXPOSURE PROPHYLAXIS (PEP)

PEP is indicated for persons with close exposure to person with known invasive meningococcal disease including the following groups: household contacts, military personnel sharing the same sleeping quarters, people socially close enough to have shared eating utensils, close friends at school but not the entire class, younger children in a day care center with an infected case. Healthcare workers who are directly exposed to patients oral secretions (i.e. mouth-mouth resuscitation, endotracheal intubation, or endotracheal tube management)

Prophylaxis should be provided to all exposed persons with the above close contact if the case meets CDC definitions for confirmed, probable, or suspected diseases (see attached case definitions). Post-exposure antibiotic prophylaxis should be provided to persons even it they have had the meningococcal vaccine.

Healthcare providers should seek the advice of the Orange County Health Department before recommending prophylaxis to all but household contacts.

The preferred PEP for an adult is ciprofloxacin (500 mg PO x 1 dose). Alternatives include ceftriaxone (250 mg IM x 1 dose) and rifampin (600 mg PO 2x/day for 2 days). For pregnant women the preferred PEP is ceftriaxone (250 mg IM x 1 dose). Exposed persons should be screened for active infection (indicated by fever, headache, rash, etc.) and if they have symptoms/signs of active infection properly evaluated and treated.

PEP should be provided as soon as possible after an exposure (ideally within 24 hours). Efficacy >14 days after onset of illness in the contact is probably of limited or no value. Oropharyngeal or nasopharyngeal cultures are not helpful in determining the need for chemoprophylaxis (PEP).

Meningococcal vaccine should not be routinely provided as part of PEP. Following a meningococcal exposure chemoprophylaxis should be provided as above even if the patient has previously received meningococcal vaccine. Meningococcal vaccine may be offered to employees as part of outbreak control in some circumstances.

MANAGEMENT OF EMPLOYEES WITH NASOPHARYNGEAL COLONIZATION WITH N. MENINGITIDIS

Employees with a positive oro- or naso-pharyngeal culture for N. meningitidis will NOT be excluded from work unless exposed to a person with invasive meningococcal disease within the previous 14 days.

MANAGEMENT OF EMPLOYEES WITH POSSIBLE INVASIVE MENINGOCOCCAL INFECTION

All employees with possible invasive meningococcal infection will be immediately place in an exam room and have mask placed over their nose and mouth. They will be transferred to ED as soon as possible (notify ED prior to transfer). Appropriate emergency care (e.g., resuscitation if needed) should be initiated. Employees with possible invasive infection will be excluded from work until they have received >24 hours of effective therapy.
Medications, Vaccines, and Laboratory Tests That May Be Ordered Per This Protocol

Medication Which May Be Ordered Under This Protocol

- **1st Choice:** Ciprofloxacin 500 mg PO x 1 dose
  - Chose ceftriaxone for employees with an allergy or contraindication to quinolones, or who are pregnant.
- **Alternative 1:** Ceftriaxone 250 mg IM x 1 dose.
- **Alternative 2:** Rifampin 600 mg PO 2x per day for 2 days.
- MCV4 (MenactraT) vaccine
- MPSV4 (Medomune) vaccine

David J. Weber, M.D. _____________________  Date _____________________
Medical Director

REFERENCES

Check List For Providing Post-Exposure Prophylaxis
To Exposed Healthcare Workers In The ED

1. Place all patients with known or suspected invasive infections due to Neisseria meningitidis immediately on Droplet Precautions (private room, wear surgical mask or N95 respirator when entering the room).

2. Notify Hospital Epidemiology (6-1638 during normal working hours or 216-6652 on nights and weekends) of all patients with known or suspected invasive infections due to Neisseria meningitidis.

3. During normal working hours (M-F, 8 AM to 4 PM) refer healthcare workers with unprotected exposure to persons with invasive infections due to Neisseria meningitidis as follows:
   a. Students to Campus Health Service
   b. University personnel to University OHS (ACC)
   c. Health Care System employees and Orange County employees to Hospital OHS (West Wing)

4. On nights, weekends, and holidays the ED attending may elect to provide PEP for exposed Health Care System employees. The following steps MUST be taken.
   a. Provide PEP only to employees who have had a high-risk exposure (see below).
   b. Have the employee complete an Incident Form (send the form to OHS)
   c. Register the employee
   d. Obtain a brief history and physical exam. Document any allergies to antibiotics or contraindications to the chosen medical prophylaxis. Document that the staff member does not have signs or symptoms compatible with meningococcal infection.
   e. Write a short note for that is placed in the Medical Record documenting the exposure and exact PEP provided
   f. Obtain ciprofloxacin from the Pixis
   g. Arrange for the employee to come to OHS on the next working day for follow-up.
   h. Instruct the employee to re-present to the ED for any signs or symptoms of invasive meningococcal infection.

5. This protocol is NOT designed for providing PEP to persons other than exposed healthcare workers. Consult with Hospital Epidemiology, Infectious Diseases, and/or Orange County Health Department for PEP for persons exposed outside the healthcare environment.

DEFINITION OF EXPOSURE (for healthcare providers)

1. Patient meets the CDC definition for confirmed, probable, or suspected invasive meningococcal infection. We do not provide PEP following exposure to patients with sepsis or meningitis of unknown etiology unless the meet the CDC definitions (attached).

2. In the absence of proper precautions (e.g., not wearing a surgical mask or N95 respirator): Close contact to an infected patient as defined by exposure to respiratory secretions such as with mouth-to-mouth resuscitation, endotracheal intubation, or endotracheal tube management. Non-direct contact (e.g., being the same room, taking a history) unless close enough to have been directly exposed to respiratory secretions does NOT constitute an exposure.

3. Refer to Appendix #1 for CDC Case Definition of Meningococcal Disease (Neisseria meningitidis), invasive.
Meningococcal Disease (Neisseria meningitidis), invasive - 2005 CDC Case Definition

Clinical description

Meningococcal disease manifests most commonly as meningitis and/or meningococcemia that may progress rapidly to purpura fulminans, shock, and death. However, other manifestations might be observed.

Case classification

Suspect:
- Clinical purpura fulminans in the absence of a positive blood culture
- A clinically compatible case with gram negative diplococci from a normally sterile site (e.g., blood or CSF)

Probable: A clinically compatible case that has either:
  - Evidence of *N. meningitidis* DNA using a validated polymerase chain reaction (PCR), obtained from a normally sterile site (e.g., blood or CSF) 1, OR
  - Evidence of *N. meningitidis* antigen by immunohistochemistry (IHC) on formalin-fixed tissue or latex agglutination of CSF 2,3

Confirmed: A clinically compatible case AND isolation of *Neisseria meningitidis* from a normally sterile site (e.g., blood or cerebrospinal fluid {CSF} or, less commonly, synovial, pleural, or pericardial fluid) or skin scrapings of purpuric lesions.

3 Positive antigen test results from urine or serum samples are unreliable for diagnosing meningococcal disease.