

Meningococcal Disease

1. DISEASE REPORTING

A. Purpose of Reporting and Surveillance

1. To identify persons who have been significantly exposed to the index case, in order to recommend antibiotic prophylaxis and to inform them about signs and symptoms of illness.
2. Under very rare circumstances, to recommend prophylactic immunization in a defined population or community.

B. Laboratory And Physician Reporting Requirements

Physicians and others providing health care must report confirmed or suspected cases to the LHD by telephone within 24 hours. If LHD staff are unreachable, they must contact DHS Oregon Public Health Division (PHD). Laboratories are required to report within 1 working day, and to submit all isolates from normally sterile sites to the OSPHL.

C. Local Health Department Reporting and Follow-Up Responsibilities

1. Report all confirmed and presumptive (but *not* suspect) cases to PHD (see definitions below) within 24 hours of initial physician/lab report. Use the standard case report form.
2. Begin follow-up investigation within 24 hours. Use the combined Meningococcal Disease case investigation form (download at <http://oregon.gov/DHS/ph/acd/reporting/forms/mening.pdf>). Send a copy of the completed form to PHD within 7 days of initial report.
3. Identify significant contacts and recommend prophylaxis within 24 hours of report.
4. If the case is lab-confirmed, make sure that the isolate is forwarded to the OSPHL.

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Neisseria meningitidis—a Gram-negative diplococcal bacterium with nine serogroups that have been frequently associated with systemic disease: A, B, C, D, X, Y, Z, 29E, and W135. Four other serogroups (H, I, K, and L) rarely cause invasive disease. Groups B and C are the most common causes of disease in Oregon and the United States.

B. Description of Illness

Disease is characterized by acute onset of fever, headache, weakness, low blood pressure, and rash. The rash may be initially urticarial, maculopapular, or petechial, and often appears in areas where elastic in underwear or socks applies pressure to the skin, or in the fingernail beds. Invasive disease may occur without signs of meningitis. In infants and small children, fever and vomiting are often the only symptoms. All clinical illnesses associated with *N. meningitidis* are significant and warrant investigation. In the absence of associated invasive disease, finding *N. meningitidis* in sputum is not considered a remarkable event, and is not reportable. In addition to the more common presentations of bacteremia and meningitis, *N. meningitidis* can cause pneumonia or primary meningococcal conjunctivitis.

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The exact mechanism allowing the penetration of meningococci from the nasopharyngeal membranes is unknown, but a recent upper respiratory tract infection may facilitate invasion. Factors that increase carriage and disease risk include crowded living conditions (like army barracks) and either primary or secondary tobacco smoke exposure. Recently, having a cochlear implant procedure has been identified as a possible risk factor for invasive disease.

C. Reservoirs

Humans are the sole reservoir.

D. Modes of Transmission

Transmission is by direct exposure to droplets or direct contact with discharges from the nose or throat of a colonized person—symptomatic or otherwise. It is important to distinguish colonization from disease. Colonization is common, but invasive disease is very rare. Surveys of household or other contacts of cases reveal that 5% - 25% of these persons may carry *N. meningitidis* in the nasopharynx. Most individuals are carriers at some point in their lives; that carriage can be chronic, intermittent, or transient. Disease incidence is highest in late winter to early spring. It occurs most frequently in children less than 5 years old, with a peak incidence in children aged 6-12 months, but since 1990 the rate in Oregon has increased markedly in persons between 10 and 25. Close contacts of cases (e.g. household members or day-care contacts) are at increased risk of becoming colonized/infected and developing illness. The attack rate for household contacts of cases is 0.3-1% (some 300-1,000 times the rate for the general population). Although risk of disease to close contacts is highest during the 10-day period following onset of illness of the first case, an elevated risk may extend for up to 60 days.

N. meningitidis spreads via the bloodstream after penetration of the mucous membranes of the nasopharynx. The exact mechanism allowing for penetration is unknown: a recent URI probably facilitates colonization and systemic dissemination.

E. Incubation Period

Usually 3 to 4 days, but may range from 2 to 10 days

F. Period of Communicability

Persons are infectious as long as meningococci are present in discharges from the nose or pharynx. Cases are probably most infectious during the 3 days prior to onset of symptoms, and are considered no longer communicable 24 hours after initiation of treatment or chemoprophylaxis with appropriate antibiotics. Those exposed 7 or more days before onset of illness in the case are not at significantly increased risk. Depending on the antimicrobials used, therapy for invasive disease may *not* eradicate the organism from the nasopharynx, and chemoprophylaxis may also be required (see §5C).

G. Treatment

Penicillin G, administered intravenously in high doses every 4 to 6 hours, is the therapy of choice for invasive disease. Third generation cephalosporins are also used. The duration of therapy is usually 7 to 10 days.

3. CASE DEFINITIONS, DIAGNOSIS, AND LABORATORY SERVICES

A. Confirmed Case Definition

Culture of *N. meningitidis* from a normally sterile site (*not* a sputum specimen or throat swab) or demonstration of *N. meningitidis* DNA by nucleic acid test [i.e., a validated polymerase chain reaction (PCR) test] from a normally sterile site.

B. Presumptive Case Definitions

Any patient with one of the following:

- immunohistochemical stain positive for *N. meningitidis*
- Gram-negative diplococci visualized on microscopic examination of a specimen obtained from a normally sterile site, such as blood or CSF, or

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- consistent signs and symptoms occurring within 2-10 days of contact with a confirmed case during the period of communicability.

C. Suspect Case (*not* reportable to OHS)

Any person with an undiagnosed compatible illness, with or without signs or symptoms of meningeal irritation (see §2B).

D. Services Available at the State Public Health Laboratories

OSPHL will confirm the identification and serogroup isolates of *N. meningitidis*. Pure isolates should be sent on appropriate media that support the growth of the organism (e.g., chocolate agar). All specimens must be properly packaged in double containers with absorbent material around them and the Bacteriology/Parasitology form (#75). These specimens should *not* be sent with cold packs. **All isolates of *N. meningitidis* obtained from a normally sterile site must be sent to the OSPHL.** (For more information, see the Laboratory's *Guide to Services* at: <http://oregon.gov/DHS/ph/phl/docs/guide.pdf>)

4. ROUTINE CASE INVESTIGATION

A. Case Interview

Interview the case (or parents) and others who may be able to provide pertinent information.

1. Identify Source of Infection

Often not possible, because of the high percentage of people who carry the organism. However, it is useful to ask whether any household, day-care, or other close contacts have recently had an illness suggestive of meningococcal disease.

2. Identify Potentially Exposed Persons

Obtain the name, address, and telephone number of all persons who have had *significant* exposure to the case during the communicable period. These include:

- a. all persons who have spent *at least* 4 hours (cumulatively, within one week of index patient's onset) in close, face-to-face association with the case, thereby increasing the risk of droplet transmission (e.g. household members, day-care contacts, cellmates); or
- b. anyone directly exposed to the patient's nasopharyngeal secretions (e.g., via kissing, mouth-to-mouth resuscitation, intubation, or nasotracheal suctioning). Health care workers who have not had direct contact with the case's nasopharyngeal secretions are *not* at increased risk, and prophylaxis is not indicated.

B. Culturing of exposed persons

While sometimes suggested by well-meaning persons as a means to identify carriers, this is not a useful exercise.

C. Environmental Evaluation

Generally, none, although in outbreak settings an investigation may be warranted to identify environmental factors (disinfection practices, ventilation patterns, etc.) that may favor droplet transmission.

5. CONTROLLING FURTHER SPREAD

A. Education

Potentially exposed persons should be instructed to watch for fever, rash, lethargy, irritability, headache, loss of appetite, or vomiting. Should signs or symptoms develop within the next two weeks, they should seek medical care immediately. They should be advised that an elevated risk may persist for 60 days.

B. Isolation

In addition to standard precautions, hospitalized cases should be placed under droplet precautions until at least 24 hours after initiation of antibiotic treatment or prophylaxis.

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C. Case Follow-up

Some of the antibiotics commonly used for treatment do not reliably eradicate nasopharyngeal colonization. Unless ceftriaxone or ciprofloxacin (which are effective against colonization) were used, the patient should also be chemoprophylaxed with an effective antibiotic before hospital discharge.

D. Protection of Contacts

1. Passive Immunization

None.

2. Active Immunization

Two vaccines are available for use in the U.S. Aquadrivalent vaccine (MPSV4 against serogroups A, C, Y, and W135) is available for use in the United States in single and multiple-dose vials. It is administered subcutaneously as a single 0.5 ml dose. The vaccine induces specific serogroup immunity in approximately 14 days however, it does not induce a good response against group C in very young children. Duration of vaccine-induced protection may be up to three years (less in children younger than 5 years of age). In 2005, a new conjugate vaccine (MCV4 against serogroups A, C, Y, W135) was licensed for use in those aged 11-55 years. It is a single intramuscular dose; immunity is assumed to be lifelong because of the conjugate technology but no data are yet available on long-term immunity. It is recommended for routine vaccination of children 11-12 years old, previously unvaccinated adolescents at high school entry, and college students living in dorms. Unfortunately, neither vaccine is protective against serogroup B, the most common serogroup in Oregon. Contact tracing may represent an opportunity for vaccination among these specific populations.

Vaccine is also recommended for individuals with genetic deficiencies of certain complement components, those with anatomic or functional asplenia, microbiologists routinely exposed to isolates of *N. meningitidis*, military recruits, and persons who travel to or reside in countries where *N. meningitidis* is endemic (typically in Africa and Asia). Vaccination may be useful when a significant outbreak of disease due to serogroup A, C, Y, or W135 is *continuing* in a defined population, *e.g.*, a school, institution, or community. Vaccination is not recommended to protect contacts of sporadic cases. Consult with the Communicable Disease Section before recommending vaccine.

3. Antibiotic Prophylaxis

Chemoprophylaxis should be recommended for all household members of confirmed or presumptive cases and other exposed persons, as defined in §4A. Prophylaxis should be initiated as soon as possible. If more than 14 days have passed since the last contact with the index patient, chemoprophylaxis is likely to be of little benefit. Chemoprophylaxis should also be recommended to day-care contacts under certain circumstances (see §6). It should not be recommended to persons who have had only brief or casual contact with the case. If such persons are anxious about their exposure, they should be advised that their risk of disease is extremely low. They should be further advised to be alert to signs and symptoms of illness, especially fever, and to seek medical care immediately should illness develop.

Prophylaxis of close contacts of culture positive patients with pneumonia or primary meningococcal conjunctivitis without accompanying bacteremia is not recommended in the U.S. due to a lack of evidence of transmission¹.

Rifampin is the drug of choice in most instances, unless the isolate is known to be sulfa sensitive. The rifampin dosage for persons >18 years old is 600 mg twice daily for two days; for children over 1 month of age, 10 mg/kg twice daily (maximum 600 mg/dose) for two days; and for those under 1 month of age, 5 mg/kg twice daily for two days. Rifampin is available in 150

¹Some health care providers in the U.S., the U.K., and Canada do recommend prophylaxis of household contacts and health care workers exposed to cases of meningococcal pneumonia and primary meningococcal conjunctivitis in absence of national recommendations in the U.S..

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mg and 300 mg capsules. It can be mixed with several teaspoons of applesauce or jelly, or suspended in a simple syrup (Syrup NF, Wild Cherry Syrup, etc.), following the manufacturer's instructions. *Rifampin chemoprophylaxis is not recommended for pregnant women.* Those taking rifampin should be informed that gastrointestinal upset, orange discoloration of urine, discoloration of soft contact lenses, and decreased effectiveness of oral contraceptives can occur. Rifampin is ~90% effective in eradicating the carrier state. Note that the rifampin schedule for eradication of *Haemophilus influenzae* carriage is efficacious against *N. meningitidis* carriage as well, but *not vice versa*.

If contacts meeting prophylaxis guidelines have been advised *by the LHD* to take rifampin, *and* they are unable to obtain rifampin by *any other means* due to financial circumstances, then the LHD may dispense rifampin out of its TB stock after consulting with the TB Program or Public Health Division epidemiologist on call. The LHD must then send a memo to the state TB program describing the circumstances, accounting for the rifampin dispensed and requesting replacement of stock.

Ceftriaxone can be used for children and adults (including pregnant women) to eradicate nasopharyngeal carriage if rifampin is contraindicated. It is given as a single IM dose of 125 mg for children under 15 years of age and 250 mg for older persons.

Ciprofloxacin can be used for chemoprophylaxis of persons >18 years old. It is administered orally in a single 500 mg dose. *Cipro is not recommended for pregnant women.*

If the organism infecting the case is *known* to be sulfa sensitive, **sulfadiazine** may be used for prophylaxing contacts (including pregnant women).

6. MANAGING SPECIAL SITUATIONS

A. Case Attends a Day-care Facility

If the child has attended any such facility for at least 4 hours (cumulatively) during the week before onset, then within 24 hours of the initial report:

1. The operator of the day-care facility should be interviewed to determine whether other cases of meningococcal disease occurred among attending children during the past 60 days.
2. The parents of children who are in the same classroom as the case should be notified (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 two-week period for signs of illness, especially fever, and seek medical care immediately if illness should occur. Advise parents that an elevated risk may persist for up to two months following the occurrence of a case.
3. Instruct the day-care operator to notify the LHD immediately if another person becomes ill with s/s of meningococcal disease over the next two months.
4. Chemoprophylaxis should also be given to all staff in the ill child's classroom.
5. Children and staff in other rooms are usually not at elevated risk, and do not need chemoprophylaxis.

B. Multiple Cases in a Defined Population within a 3 month Period

If three or more confirmed or probable cases of meningococcal disease of the same serogroup among persons who have a common affiliation but not close contact occur within a 3 month period, a primary attack rate should be calculated. Contact Oregon Public Health Division immediately for consultation.

UPDATE LOG

This is the corrected version of what was meant to be the July release. The confirmed case definition was modified to incorporate PCR results. Recommendations for the new conjugate vaccine MCV4 were incorporated into the active immunization section. Primary meningococcal conjunctivitis and pneumonia were added as uncommon but possible presentations of meningococcal disease. Primary author June Bancroft.