



Report Immediately

Invasive Meningococcal Disease

Disease Plan

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Last updated: August 20, 2015, by Jeffrey Eason

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology at 801-538-6191.

✓ WHY IS INVASIVE MENINGOCOCCAL DISEASE IMPORTANT TO PUBLIC HEALTH?

Neisseria meningitidis (*N. meningitidis*) is a leading cause of bacterial meningitis and sepsis in the United States. It can also cause focal disease, such as pneumonia and arthritis. *N. meningitidis* is also a cause of epidemics of meningitis and bacteremia in sub-Saharan Africa. The World Health Organization (WHO) has estimated that meningococcal disease was the cause of 171,000 deaths worldwide in 2000.

During 2005-2011, an estimated 800-1,200 cases of meningococcal disease occurred annually in the United States, representing an annual incidence of 0.3 cases per 100,000 population/year. The incidence has declined annually since a peak of disease in the late 1990s. Since 2005, when the quadravalent conjugate vaccines were licensed, declines have occurred among all age groups and in all vaccine-contained serogroups. Due in part to vaccination, less than 2% of meningococcal disease cases are outbreak-associated, but outbreaks do still occur, especially in overcrowded population environments. Sporadic cases of meningococcal disease account for 98% of cases. When a meningococcal case is identified, Utah public health ensures timely antimicrobial chemoprophylaxis of close contacts to prevent further disease transmission.

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description

Clinical presentation of an invasive infection with *N. meningitidis* may include:

- Fever
- Petechial rash
- Purpura
- Sepsis

There are different clinical manifestations of *N. meningitidis*:

Bacteremia without sepsis

This tends to be a mild disease, often appearing as an upper respiratory disease or viral exantham (rash). Blood cultures will be positive for *N. meningitidis*. This disease has a chronic state that can be mistaken for gonococcemia. Chronic bacteremia may be due to an immunologic deficiency.

Meningococemia without meningitis

The patient appears septic, with leukocytosis (increased white blood cells), skin rash, generalized malaise, fatigue, weakness, headache, and hypotension. Petechiae and disseminated intravascular coagulation (DIC) are also common. Meningococemia is the most severe presentation of this disease.

Meningococcal meningitis

Patients present with sudden onset of headache, fever, and a stiff neck. Nausea, vomiting, photophobia, and an altered mental status are commonly reported. Depending on the age and health status of the patient, the clinical presentation will vary. In newborns and infants, the classic symptoms of fever, headache, and neck stiffness may be absent or difficult to notice.

Meningoencephalitis manifestations

Patients are profoundly ill with meningeal signs and septic spinal fluid. Deep tendon and superficial reflexes are altered (absent or hyperactive). Pathologic reflexes are frequently present.

Pneumonia

Symptoms include cough, chest pain, chills, rales, and pharyngitis. This can be difficult to diagnose because a sputum culture could be contaminated with respiratory flora (from a carrier), and the incidence of sepsis is low (therefore blood cultures are unlikely to be of value).

Other manifestations include:

- Epiglottitis
- Urethritis
- Arthritis
- Pericarditis
- Conjunctivitis (Primary meningococcal conjunctivitis)



Image: Petechial Lesions

Patients can progress between manifestations during their course of illness.

Petechial lesions are common with this disease, but may be missed. Lesions can occur in obscure places such as the hard palate and conjunctiva, but are generally seen on the trunk and lower limbs. It is important to carefully examine the patient, as petechia can sometimes be found only in pressure points, such as under socks or underwear elastic. The petechial rash corresponds to thrombocytopenia and is an indicator of DIC. Some patients may also present with a maculopapular rash, but it is transient.

Causative Agent

Meningococcal meningitis is caused by the Gram-negative diplococci *N. meningitidis*. The sides are flattened and this organism is recognizable in Gram stain by an experienced microscopist. There is a polysaccharide capsule surrounding the organism; differences in this capsule are the basis for the serogroup. This organism is fastidious in its growth requirements, but virtually all clinical microbiology laboratories can grow it in culture.

There are at least 13 serogroups of this organism: A, B, C, D, X, Y, Z, E, W-135, H, I, K, and L. In the United States, serogroups B, C, and Y cause approximately one-third of invasive

meningococcal disease cases. In 2013 and 2014 serogroups B, C, and Y were responsible for 70% of invasive meningococcal disease in Utah.

Differential Diagnosis

N. meningitidis is an invasive bacterial disease and must be differentiated from bacteria that create similar symptoms, such as *Streptococcus pneumoniae*, Group A and B strep, and *Haemophilus influenzae*. *Neisseria* have a characteristic presence on Gram stain (Gram-negative diplococci) which can assist with discrimination, especially when antibiotics have been started prior to collection of specimens for bacterial culture.

Laboratory Identification

N. meningitidis is not difficult to identify in the laboratory and is typically diagnosed by isolation of *N. meningitidis* from a normally sterile site. Typical specimens to obtain include blood, CSF, synovial, pleural, or pericardial fluid.

- **Culture** – Typically, meningococcal meningitis is identified via Gram stain of the CSF and subsequent culture. The morphology of the organism is sufficient to suspect meningococcal meningitis rapidly through the Gram stain. The confirmatory culture should be available the next day. One problem with culture is with patients who are treated with antibiotics PRIOR to the lumbar puncture (LP). Ideally, both CSF and blood cultures should be collected before initiating antibiotic therapy. When this is not possible, both blood and CSF culture should be collected as soon as possible after the initiation of antimicrobial therapy. Cultures can be rendered sterile as soon as two hours after initiation of antimicrobial therapy.
 - **UPHL:** *N. meningitidis* isolates are required to be submitted to the Utah Public Health Laboratory (UPHL) for serotype determination.
- **PCR amplification (DNA detection)** – PCR amplification has the advantage of being rapid and less susceptible to the influence of prior antibiotic treatment than culture. PCR is highly sensitive and specific.
- **Serologic testing** – May be used as part of evaluation if meningococcal disease is suspected, but should not be used to establish a diagnosis.
- **Antigen tests** – Antigen tests for CSF, urine, and serum are available. Tests which detect polysaccharide antigen in CSF are rapid and specific, but false negative results are common, particularly with serogroup B disease. However, the tests using urine or serum specimens are unreliable.

Treatment

Immediate recognition and treatment of meningococcal disease is critical. Persons with suspected meningococcal disease should be treated promptly without waiting for laboratory confirmation. Early and appropriate antibiotic treatment markedly improves the outcome of meningococcal infections.

Antibiotic therapy – Once the diagnosis of meningococcal infection is seriously considered, ideally no more than 30 minutes should elapse before the administration of appropriate antibiotics. Blood cultures should be drawn and antibiotic therapy should **not** be delayed while waiting for lumbar puncture to be performed. Pre-treatment with antibiotics can substantially diminish the probability of a positive CSF culture, but the diagnosis can often still be established from pre-treatment blood cultures.

Third-generation cephalosporins, such as cefotaxime or ceftriaxone, should be used to treat suspected (e.g., Gram stain with gram-negative diplococci) or culture-proven meningococcal infection prior to susceptibility results being available. If the organism is proven to be penicillin susceptible, the treatment can then be switched to penicillin, although it is also reasonable to continue therapy with a third-generation cephalosporin.

Therapy information is current, however, clinicians should consult with an infectious disease specialist or appropriate reference to verify current therapies.

Drugs that are not effective include first-generation cephalosporins and sulfonamides.

Case Fatality

The case fatality is highly variable and depends on the disease and availability of appropriate health care. Meningitis or pneumonia fatality is about 7-13%, whereas fatality with septicemia can be as high as 19%. Some survivors (~10-20%) will suffer from long-term sequelae such as hearing loss, mental deficits, and loss of limbs.

Reservoir

Humans are the only known reservoir. Up to 25% of the population may carry *N. meningitidis* in their nasal mucosa without symptoms. In closed populations, such as military or residential living centers, carriage rates can be much higher. Carriage can be infrequent, intermittent, or long-lasting.

Transmission

Carriers spread the organism via the respiratory route. Transmission is relatively inefficient, and close contact is necessary.

Susceptibility

Meningococcal disease rates in children younger than one year peak at 0-6 months. More than 50% of meningococcal disease in children 0-6 months is caused by serogroup B. In time, children gradually become exposed to meningococci and develop bactericidal antibodies. By the time they reach adulthood, 65%-85% of persons possess antibodies against meningococcal disease.

Individuals thought to be at higher risk include those with underlying immune deficiencies (asplenia, complement deficiency). Other risk factors include crowding (such as living in a dormitory or military barracks), tobacco smoke (use or exposure), and microbiologists who are routinely exposed to isolates of *N. meningitidis*. Outbreaks typically occur in closed settings such as childcares, schools and colleges (especially freshmen living in dormitories), and military training camps.

Household contacts are at increased risk (from 500 to 800 fold higher than non-household contacts) of developing disease following exposure.

Incubation Period

The incubation period is usually 3-4 days, with a range of 2-10 days.

Period of Communicability

People are thought to be infectious until 24 hours after initiation of antibiotic therapy.

Epidemiology

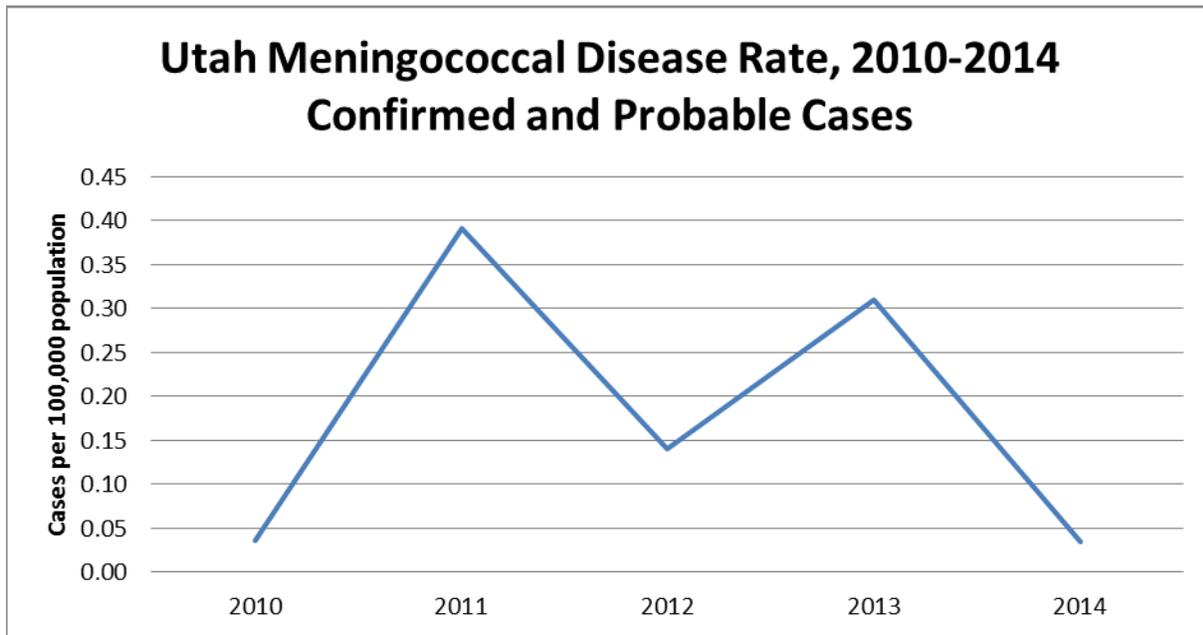
The epidemiology of meningococcal meningitis is still unclear. Various questions remain unanswered on the sporadic, episodic nature of this disease, the susceptibility of certain populations, carrier eradication, transmission, and the failure to produce a serogroup B vaccine that elicits immunity. *N. meningitidis* is the second most common cause of community-acquired adult bacterial meningitis, and the leading cause in children and young adults since the availability of the Hib vaccine. People may be more likely to acquire *N. meningitidis* with co-morbidity of a viral infection.

One of the unusual features of *N. meningitidis* is that it can be carried in the throats of perfectly healthy individuals. However, there is a positive relationship between the rate of carriage (or possibly transmission, not carriage) in a population, and the onset, rise, and decline of an epidemic. Other respiratory diseases usually cause no change or decrease in the carriage rate of *N. meningitidis*. Carriers fall into three groups – chronic, intermittent, and transient. Chronic carriers can be colonized for up to two years. The carrier state appears to immunize the carrier.

There is a correlation between the capsular phase variation, bacterial invasion, and disease outbreaks. People with invasive disease are more likely to have been recently colonized; disease is thought to occur within the first week of acquisition.

Shifts in the age distribution of cases can forecast the onset of an epidemic situation. Epidemics tend to occur in 5-19 year olds. Less than 2% of meningococcal meningitis cases are due to outbreaks. Outbreaks are most likely to occur in childcare settings, military recruit camps, schools, and colleges.

From 2005-2011, an estimated 800-1,200 cases of meningococcal disease occurred annually in the United States, a rate of 0.3 cases per 100,000 population/year. In Utah, meningococcal disease rates vary by year. From 2010-2014, there was an average of five (5) reported cases per year; in 2014, the incidence rate in Utah was 0.03 cases per 100,000 population/year.



Epidemic potential is related to serogroup. Also, epidemics are most likely among the poorest socioeconomic groups, where crowding and lack of sanitation is common.

Typical Causes of Epidemic Invasive Disease (Worldwide)		
Serogroup	Where	Attack Rate
A	Less developed countries	Up to 500 cases per 100,000 population/year
B	Developed countries	50-100 case per 100,000 population/year
C	Developed and undeveloped countries	Up to 500 cases per 100,000 population/year

✓ PUBLIC HEALTH CONTROL MEASURES

Public Health Responsibility

Public health has the primary responsibility for identifying and chemoprophylaxing contacts to identified cases. Other important public health responsibilities include:

- Investigating cases to determine possible linkage to other cases in Utah or beyond.
- Collecting demographic information to identify “at risk” populations.
- Encouraging “at risk” populations to receive immunization.
- Monitoring levels of disease in the community.
- Analyzing disease trends.
- Tracking age distribution and types of invasive meningococcal disease reported to public health.
- Monitoring reported serogroups, and collecting and reporting sufficient information to determine whether there is a changing pattern, and whether vaccine is covering the majority of reported cases.

Prevention

Prevention methods for meningococcal disease include: vaccination, use of droplet precautions, treatment of cases, and chemoprophylaxis of close contacts following identification of an index case.

Droplet precautions should be continued for 24 hours after institution of effective antibiotics in patients with suspected or confirmed *N. meningitidis* infections.

Chemoprophylaxis

If the patient has a positive culture for *N. meningitidis*, all close contacts should be prophylaxed with antibiotics. See section “Identification of case contacts” for information on determining what people are considered close contacts of the case.

Prophylaxis is not indicated if exposure to the case is brief. This includes a majority of healthcare workers, unless there was direct exposure to respiratory secretions (as with suctioning or intubation).

Additionally, prophylaxis is not recommended for close contacts of patients with evidence of *N. meningitidis* only in non-sterile sites such as an oropharyngeal swab, endotracheal secretions, or conjunctival swab. Reports of secondary cases after close contact to persons with non-invasive pneumonia or conjunctivitis are rare.

The rate of secondary disease in contacts is highest immediately after onset of disease in the index patient. Because of this, antibiotic prophylaxis should be administered as early as

possible (ideally <24 hours after identification of the index patient). Antibiotic prophylaxis administered >14 days after exposure to the index patient is not recommended.

If the patient was treated with antibiotics before the culture was obtained, and no bacteria are found, then the decision to administer prophylaxis to close contacts becomes more difficult. Each situation should be reviewed individually to determine the likelihood of invasive meningococcal disease. The State Epidemiologist can assist with this review process.

Note: rifampin and ciprofloxacin are not recommended for pregnant or possibly pregnant women.

Recommended chemoprophylaxis regimens for high-risk contacts and persons with invasive meningococcal disease

Drug	Age	Dose	Duration	Efficacy (%)	Cautions
Rifampin	<1 mo	5 mg/kg, orally, every 12 h	2 days		
Rifampin	≥1 mo	10 mg/kg (maximum 600 mg), orally, every 12 h	2 days	90-95	Can interfere with efficacy of oral contraceptives and some seizure prevention and anticoagulant medications; may stain soft contact lenses Not recommended for pregnant women
Ceftriaxone	<15 y	125 mg, intramuscularly	Single dose	90-95	To decrease pain at injection site, dilute with 1% lidocaine
Ceftriaxone	≥15 y	250 mg, intramuscularly	Single dose	90-95	
Ciprofloxacin	≥18 y	500 mg, orally	Single dose	90-95	Not recommended for persons <18 years of age Not recommended for pregnant women
Azithromycin ^a		10 mg/kg (maximum 500 mg)	Single dose	90	Not recommended routinely Equivalent to rifampin for eradication of <i>Neisseria meningitidis</i> from nasopharynx in one study

Source: American Academy of Pediatrics. Meningococcal Infections. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. Red Book: 2006 Report of the Committee on Infectious Diseases, 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006:456.

^aUse only if fluoroquinolone-resistant strains of *N meningitidis* have not been identified in the community.

Vaccine

Widespread vaccination of contacts would not be advised except during outbreaks. Ensure that the vaccine covers the serogroup of the circulating bacteria before implementing this strategy in an outbreak setting.

Types of vaccine

- Meningococcal Polysaccharide Vaccine (MPSV4)
 - Menomune
- Meningococcal Conjugate Vaccine (MCV4)
 - MenHibrix
 - Menactra
 - Menveo

Both MPSV4 and MCV4 can prevent four types (A, C, Y, and W-135) of meningococcal disease, including 2/3 types most common in the United States.

- Serogroup B Meningococcal Vaccine (MenB)
 - MenB-FHbp
 - MenB-4C

An ACIP recommendation for MenB vaccine use in persons age 10 years or older who are at increased risk for meningococcal disease has been established. These persons include:

- Persons with persistent complement component deficiencies.
- Persons with anatomic or functional asplenia.
- Microbiologists routinely exposed to isolates of *N. meningitidis*.
- Persons identified as at increased risk because of a serogroup B meningococcal disease outbreak.

ACIP vaccination recommendations

- 0-18 year routine vaccination:
 - Two doses of MCV4 are recommended for adolescents 11-18 years of age. First dose at 11-12 years, plus a booster at age 16.
 - If the first dose is given between 13-15 years of age, the booster should be given between 16-18 years of age.
 - If the first dose is given after the age of 16, a booster is not needed.
- People at increased risk:
 - College freshmen living in dormitories.
 - Laboratory personnel who are routinely exposed to meningococcal bacteria.
 - United States military recruits.
 - Anyone traveling to, or living in, a part of the world where meningococcal disease is common, such as parts of Africa.

- Anyone who has a removed or damaged spleen.
- Anyone who has persistent complement component deficiency.
- People who might have been exposed to meningitis during an outbreak.

Current ACIP Immunization Schedules with all Meningococcal Disease vaccination recommendations by age and/or risk factor is available at:

<http://www.cdc.gov/vaccines/schedules/hcp/index.html>

✓ CASE INVESTIGATION

Reporting

All cases of invasive meningococcal disease are immediately reportable in Utah. This disease should be reported when suspected, not just when confirmed.

CSTE Reporting Criteria

Criterion	Reporting		
<i>Clinical Evidence</i>			
Petechial Rash	O		
Purpura	O	N	
Sepsis	N		
Death		N	
Healthcare record contains a diagnosis of meningococcal disease			S
Death certificate lists meningococcal disease as a cause of death or a significant condition contributing to death			S
Medical examiner case of person found dead with purulent exudate on meninges			S
Medical examiner case of person found dead with purpuric rash and/or hemorrhagic organs (particularly adrenals)			S
<i>Laboratory Evidence</i>			
Isolation of <i>N. meningitidis</i> from a normally sterile site			S
Evidence of <i>N. meningitidis</i> DNA using a validated polymerase chain reaction (PCR) obtained from a specimen collected from a normally sterile site			S
<i>N. meningitidis</i> antigen identified by immunohistochemistry (IHC) on formalin-fixed tissue			S
<i>N. meningitidis</i> antigen identified in CSF by latex agglutination			S
Gram-negative diplococci from a normally sterile site			S

S = This criterion alone is sufficient to identify a case for reporting.

N = All "N" criteria in the same column are necessary to identify a case for reporting.

O = At least one of these "O" (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column – in conjunction with all "N" criteria in the same column – is required to identify a case for reporting. (These optional criteria are alternatives, which mean that a single column will have either no O criteria; no column should have only one O.)

Case Definition (2015)

Suspected

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

Probable

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

Confirmed

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

Clinical Criteria

Clinical purpura fulminans in the absence of a positive blood culture.

Laboratory Criteria

- Gram-negative diplococci, not yet identified, isolated from a normally sterile body site (e.g., blood or CSF)
- Detection of *N. meningitidis* antigen
 - In formalin-fixed tissue by immunohistochemistry (IHC), or
 - In CSF by latex agglutination.
- Detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., blood or CSF), using a validated polymerase chain reaction (PCR) assay, or
- Isolation of *N. meningitidis*
 - From a normally sterile body site (e.g., blood or CSF, or less commonly, synovial, pleural, or pericardial fluid), or
 - From purpuric lesions.

Epidemiologic Linkage

Not applicable for case classification.

CSTE Case Classification Criteria

Criterion	Case Definition		
	Suspected	Probable	Confirmed
<i>Clinical Evidence</i>			
Purpura fulminans	N		
<i>Laboratory Evidence</i>			
Isolation of <i>N. meningitidis</i> from a normally sterile body site			S
Isolation of <i>N. meningitidis</i> from a purpuric lesion			S
Detection of <i>N. meningitidis</i> -specific nucleic acid in a specimen obtained from a normally sterile body site using a validated polymerase chain reaction			S
Detection of <i>N. meningitidis</i> antigen in formalin-fixed tissue by immunohistochemistry (IHC)		S	
Detection of <i>N. meningitidis</i> antigen in CSF by latex agglutination		S	
Identification of Gram-negative diplococci in a specimen from a normally sterile body site	S		

Notes:

S = This criterion alone is sufficient to classify a case

N = All "N" criteria in the same column are necessary to classify a case

Case Investigation Process

- Confirm the diagnosis (if patient does not have a confirmed diagnosis, but the clinician determines that the disease was likely to be due to bacterial meningitis, then it may be prudent to continue with chemoprophylaxis).
- Determine who is at risk. People thought to be at highest risk include household, childcare, and nursery school contacts. In addition, close contacts include people who have had contact with the patient's oral secretions, such as kissing, sharing toothbrushes, sharing utensils, sharing food (food that might have oral secretions, not just eating at the same table), and people who frequently ate or slept in the same dwelling as the patient. The patient is infectious during the following period of time:
 - From seven (7) days before the onset of their disease UNTIL successful completion of 24 hours of antibiotics.
- Identify all close contacts to the patient that occurred during the above risk period.
- Notify UDOH.
- Ensure that contacts are offered prophylaxis:
 - Ideally, this should occur within 24 hours after the case is identified.

- Prophylaxis given more than 14 days after the onset of illness in the index case is of limited or no value.
- All close contacts should be observed for 10 days following exposure. If any febrile illness develops, contacts should receive immediate medical attention.
- For patients on airline flights lasting more than eight (8) hours, passengers sitting directly next to the patient are candidates for prophylaxis.
- Health care workers are low risk UNLESS they provided mouth-to-mouth resuscitation or have unprotected contact during endotracheal intubation during seven (7) days prior to onset of disease OR after disease onset, but before 24 hours of antimicrobial therapy is completed.
- Consider starting enhanced surveillance for additional cases of illness.
- Ensure that the organism is serogrouped. Contact the diagnosing laboratory and have the laboratory send the specimen to the UPHL for serogroup testing.
- If more than one case is found:
 - Notify the UDOH Vaccine Preventable Diseases Epidemiologist and request assistance if needed.
 - Investigate for possible links between cases.
 - Determine if the outbreak is limited to an organization (e.g., childcare, school) or is community-wide.
 - Determine the target group for vaccination.
 - Consider enhanced surveillance or special case-finding methods.
- Ensure that information essential to trend analysis is completely filled out before the investigation is closed. Examples of such information would be: onset date, was patient hospitalized, how long was patient hospitalized, did patient die, etc.

Outbreaks

An outbreak is defined as:

- More than two cases in a closed population in a 30-day period;
- Two or more cases with direct epidemiological linkage; or
- More than two cases of PFGE-identical isolates in a 30-day period.

Identifying Case Contacts

Case contacts are those that:

- Live in the same household (especially young children); this includes roommates.
- Share the same sleeping space (e.g., military barracks or dorm rooms) during seven (7) days prior to illness onset and until 24 hours after initiation of appropriate antibiotic.
- Contacts at daycare or nursery during seven (7) days prior to illness onset and until 24 hours after initiation of appropriate antibiotic.
- Any intimate contact of case during seven (7) days prior to illness onset and until 24 hours after initiation of appropriate antibiotic.

- Close social contacts (through kissing, sharing water bottles, cutlery, or very close friends) that have had contact with the case during seven (7) days prior to illness onset and until 24 hours after initiation of appropriate antibiotic.
- Medical personnel, if they had unprotected exposure to patient secretions (e.g. mouth to mouth resuscitation, endotracheal intubation, endotracheal tube management) during seven (7) days prior to illness onset OR after illness, onset but before patient received 24 hours of appropriate antibiotic therapy.
- Travelers who have had direct contact with respiratory secretions of a case or who were seated directly next to a case on a prolonged flight (lasting ≥ 8 hours).

Isolation and Quarantine Requirements

Isolation: Patients should be on respiratory isolation until 24 hours after starting antibiotic therapy.

Hospital: Patients should be on respiratory isolation until 24 hours after starting antibiotic therapy.

Quarantine: Not applicable.

Case Contact Management

People who meet the criteria for case contacts should have:

- Prophylactic antibiotics.
 - Throat or nasopharyngeal cultures are of no value in determining who should receive prophylaxis.
- Be under fever surveillance.
 - Initiate appropriate antibiotic therapy for individuals with preliminary signs of disease.

✓ REFERENCES

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VERSION CONTROL

Update August 2015: Updated format of document. Updated case definition, current immunization information, added new Utah-specific data, and updated references and content.

✓ UT-NEDSS Minimum/Required Fields by Tab

Demographic

- patient_birth_gender
- patient_address_county
- patient_birth_date
- patient_ethnicity
- patient_first_name
- patient_race_1
- patient_address_state

Clinical

- patient_date_diagnosed
- patient_date_of_death
- patient_died
- patient_disease
- patient_disease_onset_date
- Syndrome:
- Has the patient ever been vaccinated against meningococcus?
- Date of vaccine?
- What type of vaccine?

Laboratory

- lab_organism
- lab_specimen_source
- lab_test_result

- lab_test_status
- lab_test_type

Epidemiological

- patient_day_care_association
- patient_imported_from
- Is this case epi-linked to anyone?
- Did the case have any international travel in the 30 days prior to illness onset?
- International Travel: List Country
- International Travel: List Date

Investigation

No required fields

Contacts

No required fields

Reporting

- patient_first_reported_ph_date

Administrative

- patient_outbreak_name
- patient_state_case_status
- patient_outbreak_associated