**MENINGOCOCCUS OUTBREAK RESPONSE PLAN**

**Scope and Purpose**

Although many of the procedures discussed in this plan are applicable to the investigation of other infectious diseases, this plan details the response to a meningococcal outbreak specifically. It is the intent of this plan to be fully compatible with CDC recommendations for meningococcal disease investigation and control while applying those recommendations to procedural response by NDDoH Disease Control Division and the Emergency Preparedness and Response Section. Whenever parts of this plan are dependent on other existing plans, those plans will be referenced.

This plan contains factual data derived from standard reference sources which are referenced in the text where appropriate, and listed at the end of the document.

**Agent and Illness**

Meningococcal disease is caused by Neisseria meningitidis (AKA meningococcus), a gram negative diplococcus. Humans are the only host. The bacterium can be classified into 13 serogroups of which five cause nearly all disease worldwide (A, B, C, Y, W135). Vaccine exists for A, C, Y and W135 which has altered the prevalence of disease of these serotypes since the vaccine came into general use. A vaccine for serogroup B was licensed in the U.S. in October, 2014 for ages 10-25. Serogroups B, C and Y cause almost all disease in the United States, each occurring in approximately equal prevalence. However serogroup prevalence can change over time. Serogroup B is most common in children less than 6 months old and other serogroups predominate in persons 11 years or older. Peak incidence of disease occurs at three different age groups: <5 years old, 16-21 years old and ≥65 years old. The highest case fatality by age is in the 65+ age group.

The specific presentation depends on the anatomical site of infection. Approximately 50% of cases present as meningitis with fever, headache and stiff neck with possible nausea, vomiting, photophobia and altered mental status[1]. Approximately 40% present with bacteremia, some

**Disease Statistics**

- Symptoms: Anatomic site dependent
  - Meningitis: Fever, headache, stiff neck, nausea, photophobia
  - Septicemia: Fever, petechial or purpura,
  - Pneumonia: Fever, cough, chest pain
- Incubation period: 2-10 days (avg. 3-4 days)
- Duration: Depends on site of infection, disease severity
- Hospitalization: Approaching 100% for invasive disease
- Transmissibilty: Easily spread by close contact. Transmissibility ends within 24 hours post treatment onset
- Carriage: 5%-10% of adults are nasal carriers
- Susceptibility: Children, adolescents and young adults, but susceptibility to disease is low
- Mode of spread: Droplet, direct contact with infected secretions
- Laboratory: Culture, gram stain, latex agglutination of CSF, PCR
- Environmental persistence: Does not appear to be a factor in disease transmission
- Environmental inactivation: Not indicated
- Treatment: Penicillin plus end course treatment with rifampin, ciprofloxacin or ceftriaxone to eliminate carriage
- Post-exposure prophylaxis window: 14 days
- Isolation and quarantine: Respiratory isolation for 24 hours post antibiotic initiation. Quarantine is not indicated
- Mortality: 10-14% with treatment
- Sequela: Depends on site of infection – limb loss, cerebral infarction, sensorineural hearing loss, cognitive defects, seizure
- Population risk factors:
  - Child, teen, young adult
  - Household contacts
  - Crowded living conditions
  - Daycare students and workers
  - Direct contact to respiratory secretions

[1] Young infants may not demonstrate usual symptoms.

of whom develop sepsis (meningococcemia) characterized by fever and petechial or purpuric rash. Some persons with meningococcemia will progress to purpura fulminans with septic shock and multiple organ failure. Approximately 10% of cases present as a typical bacterial pneumonia. Meningococcus can also cause myocarditis, pericarditis, endocarditis, arthritis, conjunctivitis, urethritis, pharyngitis or cervicitis.

Long term adverse effects occur in 10%-20% and depend on the specific site of infection. Limb gangrene and stroke are common after meningococcemia, and hearing loss, cognitive deficits and seizures are common after meningitis. Overall case fatality is 10%-14% and dependent on the site and severity of infection. Persons with asplenia may have a case fatality rate as high as 70%.

**Infectivity and Outbreak Origin**

Approximately 5%-10% of the U.S. population carries meningococcus in the nasopharynx with carriage more common among adolescents and young adults. Carriage induces strain specific immunity which makes middle age and older adult populations relatively resistant to infection. Illness appears to be uncommon among those who carry the organism. Persons who carry the organism are capable of spreading it by respiratory droplet. Among those that become ill following exposure to a case, 70% will have become ill in the first week and nearly all the remainder will have become ill in the second week following exposure.

Despite the transmission potential and outbreak potential of the organism, 98% of all reported cases are sporadic without an identifiable source or association with an outbreak, and 2% are outbreak associated. The low percentage of outbreaks occurring after case identification may be due both to aggressive prophylaxis of contacts of a case and the propensity of the organism to colonize far more people than it makes ill.

**Exposure Risk**

Exposure risk is defined specifically by NDDoH and guidelines are provided in Attachment 1.[2]

**Case Definition**

The following case definitions were taken verbatim from the CDC Manual for the Surveillance of Vaccine-Preventable Disease.

Confirmed case: A confirmed case of meningococcal disease is defined by isolation of *N. meningitidis* from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF]) from a person with clinically compatible illness.

Probable case: A probable case of meningococcal disease is defined by detection of *N. meningitidis* DNA by polymerase chain reaction or polysaccharide antigen in CSF (e.g., by latex agglutination or immunohistochemistry), or the presence of clinical purpura fulminans in the absence of diagnostic culture from a person with clinically compatible disease.

Primary case: A primary case of meningococcal disease is one that occurs in the absence of previous known close contact with another patient with meningococcal disease.

[2] In addition to exposure characteristics, certain host characteristics (complement deficiency, asplenia) greatly increase the likelihood of a person becoming ill after exposure. Public health responders may have a lower threshold for post-exposure prophylaxis among these individuals.

Secondary case: A secondary case of meningococcal disease is one that occurs among close contacts of a primary case-patient 24 hours or more after onset of illness in the primary patient.
Co-primary case: Co-primary cases are two or more cases that occur among a group of close contacts with onset of illness separated by less than 24 hours.

**Laboratory**
Diagnosis of meningococcus can be made as follows:

- Culture from normally sterile fluid – This is the method of definitive diagnosis.
- Gram stain of normally sterile fluid – This allows rapid, presumptive diagnosis, especially if intracellular, gram negative diplococcic are seen in the CSF.
- CSF latex agglutination – Identifies capsule, good test but false negatives and false positives can occur.
- Antigen agglutination on serum or urine - Unreliable
- PCR – Especially useful for detection of organisms in specimens taken post-initiation of antibiotics. Since treatment of suspected meningococcal should not wait for culturing, this may occur frequently. PCR is available from the Minnesota Department of Health.

Antimicrobial susceptibility testing is not routinely recommended.

Specimen Transport
One of two options is used to transport most specimens to the state lab, as follows:

1. FedEx with next day delivery
2. Courier - The courier service transports specimens to the state lab Monday – Friday from 14 major ND hospitals. Specimens arrive at the state lab late at night on the same day or very early in the morning the next day.

Need for more urgent transport and diagnosis confirmation will require separate transport mechanism. This can be arranged locally by sending designated staff with the specimen, or Disease Control (or DOC if activated) can arrange to make use of NDDoH partners (e.g., Highway Patrol).

**Surveillance**
Meningococcus is a reportable condition, and case identification is dependent on passive reporting of clinical cases. As part of an investigation of a case report, additional case finding may need to be conducted in the local area through active surveillance.

**Response to Case Surveillance Report**
Because likelihood of secondary cases is highest immediately after exposure, response to a case of meningococcus is rapid. Public health investigation, including follow-up with contacts, is started when gram negative diplococci are seen on gram stain of sterile fluid and the patient meets clinical definition. Public health responders should determine the status of the suspect case (confirmed, probable)[3], request additional diagnostics if indicated and perform a rapid search to identify additional cases by contacting the infection control nurse in the index facility and any other local facilities. The patient, if

[3] Clinicians should not wait to begin antibiotic treatment of a suspect case of meningococcus and report it to public health. Consequently, at the time of initial public health response, the case may only be suspected on clinical grounds. Additional testing may be needed to confirm the case. Public health responders will need to determine whether some contacts of unconfirmed cases should receive prophylaxis (e.g., persons at very high risk such as asplenic or complement deficient individuals) or if all contacts should receive prophylaxis only if and when the case is confirmed.

not too ill to respond, must be interviewed in depth; otherwise, family members most likely to know the activity of the case will be interviewed. Guidelines for prophylaxis will be implemented with intent to provide prophylaxis within 24 hours of investigation onset to all potential contacts.

The determination of who to provide with prophylaxis will be based on exposure (regardless of vaccination status). In the event that surrogates were interviewed instead of the patient or the patient is an unreliable reporter, the intent will be to obtain as many names as possible of potentially exposed persons and to interview those persons to determine the extent of their exposure to the index case. If close exposure cannot be reasonably excluded from the history, prophylaxis will be given. As noted above, thresholds for prophylaxis may also be lower for higher risk groups (e.g., immune impaired).

Persons without contact close enough to warrant post-exposure prophylaxis should still be given information about signs and symptoms of illness and instructions to seek medical care rapidly if these develop. The person seeking such care should let the provider know that they are a distant contact of a meningococcal case.

Post Prophylaxis Surveillance

Once a recommendation for prophylaxis is made, follow-up is performed to confirm that the exposed person is taking an appropriate agent and given instructions regarding when to seek health care.

**Response Activation**

Department Operations Center (DOC)

It is unlikely that the DOC will be activated in the absence of an outbreak of meningococcus for which resources within NDDoH Disease Control are overwhelmed. Even prophylaxis of a large number of people would likely be handled by Disease Control in cooperation with local public health. In the event that the DOC is activated, examples of assistance from the DOC likely of value in an outbreak of meningococcus include the following:

1. Activation of HAN
2. Statewide videoconferencing support
3. Personnel assistance for tasks in Disease Control (data entry, data management/analysis, vaccine record research)
4. Vaccine management and cold chain
5. Assistance with mass vaccination
6. Resources and logistics
7. Media management and activation of hotline

Role of LPHU

Specific activities would be the primary responsibility of the local public health agency; however, some local jurisdictions have very little public health capacity, so additional assistance may have to come from the state or from other local jurisdictions. Tasks which would fall to local public health include:

1. Case investigation teams – In the event that additional investigators are needed, local public health would potentially be called upon to supply personnel to assist with case investigation and contact tracing. LPH may be a ready source of nursing personnel who can obtain laboratory specimens.
2. Mass vaccination clinics – Although not routinely done, in a difficult to control outbreak with multiple cases in a single cohort, mass vaccination of the cohort may be undertaken. This would be a primary responsibility of LPH.

**External Communication**

Communicating with the Health Care System

Communication with the health care system is primarily of value to alert clinicians to the potential for additional cases to occur. This may help a clinician think to look for meningococcus as a possible cause of a compatible illness and initiate earlier treatment and provide earlier notification to public health of a suspect case[4]. The disease is not prone to cause health care facility outbreaks.

Communicating with the Public

Even a single meningococcal case can be frightening to families when another person in the same institution (day care, school) has developed meningococcal disease. Parents can create intense pressure on public health responders to provide prophylaxis to persons for whom prophylaxis is not recommended (e.g., all students in a school). Careful and consistent communication is required, primarily directed at families with family members in affected institutional settings. Discussion with the media will not be urgent since general protective measures by the public will not be needed, although the community should be aware of presenting symptoms and know when to seek medical advice.

**Disease Investigation**

Evaluation of Cases and Contacts

Careful patient interview must be done to identify all persons with high risk exposure occurring within the 7 days prior to onset of symptoms until 24 hours after initiation of antimicrobial therapy. This should be done by the investigator with a calendar in hand, obtaining a detailed history of activities and contacts for each day. The risk of missing a contact who should receive prophylaxis is potentially higher if interview of a surrogate is required.

Development of secondary cases due to inadequate contact ascertainment will not only result in one or more additional cases with the potential for death or permanent injury, but also will damage the credibility of investigators, particularly if they have refused to bow to pressure to provide prophylaxis for a much wider group of individuals than was indicated.

Documents and Forms

Investigators should have access to the following documents during an outbreak investigation:

- Interview forms – These should be standardized for a single outbreak and may include information to be collected specific to the outbreak (e.g., information about a day care or other transmission setting)
- Educational documents to provide the case or contact (or their caregiver)
- Completed line listings of current cases and contacts.
- A calendar for use in identifying daily activities and contacts

**Treatment and Post-Exposure Prophylaxis**

Treatment

Suspected invasive meningococcal disease should be treated immediately without waiting for disease confirmation or even culturing. Survival is dependent on preventing progression of the disease. A large number of antibiotics treat the meningococcus; however, not all eradicate the organism from the nasopharynx. If a person is treated with an antibiotic that does not eradiate the carriage state, the

[4] Under normal circumstances, providers are trained to obtain diagnostics for agent identification before antibiotic initiation and tend to delay reporting of a case until it is confirmed. In an outbreak setting in particular, providers should be encouraged to treat immediately on suspicion of meningococcus and learn to call public health on suspicion of an illness requiring immediate public health response.

person should be additionally treated with rifampin, ciprofloxacin or ceftriaxone before discharge; however, due to ciprofloxacin resistance in Eastern North Dakota, it is not recommended for use in that area of the state.

Post-Exposure Prophylaxis

Prophylactic treatment with antibiotics is recommended for close contacts as identified in Attachment 1. Culturing to identify nasal carriage has no place in determining who should receive chemoprophylaxis. Prophylaxis should be provided quickly since the risk of infection is highest in the days immediately following exposure. Antibiotics for use in post-exposure prophylaxis are listed in an attachment and are specific to North Dakota. Chemoprophlylaxis greater than 14 days post last exposure is not indicated.

Vaccine can be given in outbreaks due to susceptible strains but because protective antibodies will not develop for 7-10 days[5], vaccination alone is not preferred for post-exposure prophylaxis. In outbreak settings, vaccination of a susceptible cohort may be considered when:

- Three cases have occurred in a three month period
- The attack rate is greater than 10 cases per 100,000
- The outbreak is caused by a vaccine preventable strain

(Source: Control of Communicable Diseases Manual, 18th Edition)

Past history of vaccination does not guarantee continued immunity and a history of prior vaccination does not preclude the need for post-exposure prophylaxis.

Two licensed conjugate vaccines (Menactra, Menveo) and a polysaccharide vaccine (Menomune) are licensed in the US and cover A, C, Y and W135, plus a conjugate vaccine against C and Y only combined with Hib (MenHibrix) is available. (The newly licensed vaccine for serogroup B, Trumenba, does not have routine recommendations for use at this time but was used in an outbreak at Princeton University in 2013-2014.) The combined vaccine (meningococcus and Hib) is approved for 6 weeks to 18 months of age, but requires a four dose series. The single conjugates are approved for 2 years to 55 years of age. The polysaccharide vaccine can be used for persons older than age 55; however, it does not provide long lasting immunity and does not eliminate carriage. Vaccination is of greatest benefit when provided pre-exposure to high risk populations. Routine vaccination of all children at age 11 to 12 is recommended, with a booster dose at age 16. Adolescents first vaccinated after age 16 will not need a booster dose unless they are in a high risk cohort. The vaccine is not routinely given after age 21 except for persons in high risk settings. The available vaccines are summarized in Attachment 3 and Attachment 2 provides the recommended vaccination schedule.

Meningococcal conjugate vaccine is required for middle school entry in North Dakota. It is also required for students ages 21 and younger residing in campus housing at North Dakota colleges and universities. The schedule for vaccination varies by age, immune status and exposure risk. For purposes of vaccination, persons who are considered to be at high risk exposure risk are the following:

- College freshmen living in dorms
- Microbiologists with routine exposure
- Military recruits
- Travelers high risk countries
- Complement deficiency
- Asplenia

[5] Certain immune defects may prolong or impair the development of an immune response to the vaccine and efficacy may be lower in complement deficient or asplenic patients.

Vaccination does not provide prolonged immunity. Neutralizing antibodies decline over time and the anamnestic response arising from prior vaccination is not sufficient to prevent infection. Consequently, vaccination is repeated for some age groups or persons in certain risk categories (e.g., international travel to highly endemic areas).

Vaccination Precautions

The primary precaution for vaccination is allergy to any component of the vaccine including reaction to diphtheria or tetanus toxoid. Use in the immunosuppressed is acceptable but may not achieve the same level of antibody response. Pregnant women can receive the vaccine if there is an indication for vaccine administration. It appears to be safe but is not fully studied.

Adverse Reaction Reporting

Reports of adverse reactions can be reported to NDDoH, where they will be entered them into VAERS, or they can be entered directly into VAERS (vaers.hhs.org) by the clinical provider. Even if entered directly into VAERS by the provider, NDDoH should be notified of any unusually severe or unusual type of adverse reaction.

Vaccine Management

Except for some VFC vaccine, NDDoH does not maintain supplies of meningococcal vaccine in the state for use in outbreak management. However, some meningococcal vaccine exists in the state at the local public health and private provider level. Should additional vaccine be needed, it can be ordered and will arrive quickly. When possible, vaccine shipments should go directly to the local public health agency that will be using it. If vaccine needs to come to NDDoH, it will be managed by cold chain procedures developed by the NDDoH warehouse and transported or shipped to its point of use. (See Cold Chain plan). NDDoH can supply VFC vaccine for eligible recipients when needed. Funding to purchase substantial quantities of vaccine are not pre-identified in Disease Control. NDDoH may receive permission from CDC to use federal funds for outbreak control, or NDDoH may need to tap other sources in the agency to purchase vaccine (e.g., emergency response or state general funds).

Isolation and Quarantine

Within 24 hours after beginning appropriate antibiotic treatment, upper respiratory tract secretions should be clear of meningococcus. Respiratory isolation is indicated until that point. Since treatment with penicillin will only suppress the presence of viable organisms in the upper respiratory tract, an alternate antibiotic will be needed to end carriage. Quarantine of contacts is not indicated in the control of this disease.

Preventing Transmission in Health care Settings

Health care workers with close exposure (e.g., prior to recognition of the illness) will need to receive prophylaxis. PPE to prevent droplet exposure (surgical mask and face shield when indicated) should be sufficient to prevent HCW transmission. A HCW performing aerosol producing procedure prior to 24 hours of patient treatment would be expected to be at increased risk and warrants prophylaxis. In addition, HCW with direct exposure to patient oral secretions (e.g., mouth to mouth resuscitation, unprotected insertion of endotracheal tube) should receive prophylaxis

**Data Management**

During an outbreak, cases and contacts would be tracked within the MAVEN outbreak module. Cases and contacts should be entered in the system ASAP after data collection so that data is not dropped and

individuals not lost to follow-up. Basic information for the line listing should be entered into a log book at the time of data collection rather than on a random piece of paper. The log book should include space to document that specific actions have been completed for each person in the line listing (e.g., specimen collection, vaccination of contacts). Data should be entered from the log book into MAVEN on return to the base office. An aggregate line listing should be published on paper, updated daily and provided to each investigator; the aggregate listing should provide basic information about each identified case and contact. Old line listings from previous days should be shredded.

In addition to a log book, a filing system needs to be maintained for all records. Each interviewed individual may have several documents or forms including clinical summaries, interview forms, vaccination forms, release of information forms and laboratory results. Records for cases and contacts should be separated and each folder clearly label as case or contact.

CDC surveillance data collection instruments are already loaded into MAVEN; however, data collection instruments may have to be modified to include outbreak specific risk factors. If a substantial amount of data needs to entered, managed and analyzed due to a large outbreak, Disease Control might need additional assistance from NDDoH or temporary contract personnel. Persons without advanced data skills could be used to enter information and NDDoH non-infectious disease epidemiologists or analysts from other parts of the agency may be used to assist with data management, analysis and result production. These persons could either be assigned to Disease Control or work under some other part of the incident command system in support of Disease Control.

Vaccination Data

NDIIS would be used to identify vaccination completeness. If a person is not in NDIIS or records appear incomplete, vaccination history would be obtained through provider offices. Which provider offices to contact would need to be determined from the case or contact interview. Vaccination status determination requiring calls to provider offices would likely be done in Disease Control. Additional personnel assistance may be needed for this activity. Again, note that history of vaccination is not proof of immunity.

In the setting of a mass vaccination clinic, direct entry into NDIIS would be preferable, but may not be logistically possible in all situations. An alternative paper data collection form would be provided by Disease Control. These forms would need to be entered into NDIIS after the mass clinic either by local public health or by NDDoH.

Data Analysis and Report Production

Multiple types of data and multiple targets for data results will likely need to be managed during an outbreak. Source of data may include the following:

- Case information – data collected on investigation forms, complications, actions taken, lab results, case definition classification
- Control information – data collected on investigation form, immunity status, actions taken
- Surveillance data
- Intervention data (e.g., data from mass vaccination clinics)
- Vaccine management data (e.g., vaccine dose tracking)

Targets for data would primarily be the following:

- Incident command system – Case and control line listing, epi curve, geographic mapping of outbreak, related out-of-state contacts, vaccine availability, surveillance report, at-risk population susceptibility/vaccine coverage, supply transport
- Agency administration – outbreak summary information and progress reports
- Public information officer – Number of cases, populations at risk, hospitalizations or deaths, new cases/epi curve, geographic extent, progress toward disease containment
- Teams in the field – case specific information, line listings

**Worker Protection**

Investigation of a meningococcal case could pose risk to an investigator, particularly a person in a susceptible category. Respiratory protection should be used with any case that has not completed their first 24 hours of antibiotic treatment. Investigators who have been vaccinated should still wear respiratory protection since vaccine efficacy is not 100%[6]. Contacts of the case may be nasopharygeal carriers and the casual contact level of an interview should not pose a risk. Investigators in high risk categories should be vaccinated according to schedule and 10 days should have elapsed if newly vaccinated before they are potentially exposed. Should an investigator be involved in collecting specimens, the investigator should use standard precautions.

**Education and Training**

Patient and Contact Education

Each person with meningococcus and each contact will need to receive education. Generally the education will be performed by the investigator at the time the history is taken. Content of the education may include:

- Information about the disease such as manifestations and prognosis
- Incubation period post exposure
- Communicability
- Protecting family members
- Contact information to reach local public health
- Post-exposure prophylaxis including safety/risks of antibiotics or vaccine

Responder Training

Some of those called upon to respond to a meningococcal outbreak will need just-in-time training related to roles that they will fill. This may include:

- Disease information
- Role assignments
- Phlebotomy
- Provision of post-exposure prophylaxis
- Adverse reactions to post exposure prophylaxis
- Monitoring for illness and potential for illness post prophylaxis
- Obtaining specimens for laboratory evaluation
- Interviewing
- Contact tracing

Analyst/Assistant Training

[6] Studies from 2005-2008 found a vaccine effectiveness of 80% to 85%, but efficacy wanes with time since last vaccination.

Persons recruited to assist with data management will require some training as to specific tasks and products for which they will be responsible. Because the training requirements for some systems (e.g., MAVEN) are high, staff in Disease Control would likely manage aggregation of raw data from MAVEN and provide it to a single person responsible for allocating tasks among analysts and receiving back results.

**Recovery and After Action**

Several tasks will need to be completed as the outbreak winds down. These include:

1. Missed opportunities for interdiction - As part of the after action, specific focus should be placed on where opportunities were missed to prevent or control the outbreak. This may lead to procedural or policy changes. Examples might include:
    a. Missed contacts not found until they had become ill
    b. Vaccination gaps that contributed to the outbreak spread
    c. Any evidence for lack of effectiveness of post-exposure prophylaxis (may be an indication of unsuspected antibiotic resistance)
    d. Adequacy of protection of vulnerables who were at high risk of illness
    e. Failures of notification, particularly across state lines, of possible contacts which could lead to outbreaks
    f. Evidence of vaccine or cold chain problems (e.g., in warehouse/shipping, private offices or LPHU)
    g. Unique factors or populations (e.g., oil country, hard to reach populations)
2. Opportunities for increasing vaccination coverage long term
3. Training gaps e.g., vaccine storage, case investigation and contact tracing, resources for phlebotomy or vaccination of small children

**References**

Prevention and Control of Meningococcal Disease: Recommendations of the Advisory Committee on Immunization and Practices (ACIP) found at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6202a1.htm

Manual for Surveillance of Vaccine Preventable Diseases (2011) found at http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html.

David Heymann, MD, Editor. Control of Communicable Disease Manual. 18th Edition. APHA. 2004.

ATTACHMENT 1: NDDOH CLOSE CONTACT GUIDELINES

NORTH DAKOTA
DEPARTMENT *of* HEALTH

## Disease Risks for Contacts of Index Cases of Invasive Meningococcal Disease

### High Risk: Chemoprophylaxis recommended (close contact):

- Household contact, especially young children
- Child-care center or nursery school contact during 7 days before onset of illness
- Direct exposure to index patient's secretions through kissing or through sharing toothbrushes or eating utensils, markers of close social contact, during 7 days before onset of illness
- Mouth-to-mouth resuscitation, unprotected contact during endotracheal intubation during 7 days before onset of illness
- Frequently slept or ate in same dwelling as index patient during 7 days before onset of illness
- Passengers seated directly next to the index case during airline flights lasting more than 8 hours

### Low Risk: Chemoprophylaxis not recommended:

- Casual contact: no history of direct exposure to index patient's oral secretions (i.e., school or work)
- Indirect contact: only contact is with a high risk contact, no direct contact with the index patient
- Health care personnel without direct exposure to patient's oral secretions

### In an Outbreak or Cluster:

- Chemoprophylaxis for people other than people at high risk should be administered only after consultation with local public health authorities

**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: 455.

**Meningococcal Disease (invasive) is a mandatory reportable condition in North Dakota. All suspect and confirmed cases should be reported immediately to the North Dakota Department of health at 701.328.2378 or toll-free at 800.472.2180.**

# Attachment 2: Recommended chemoprophylaxis regimens for high-risk contacts and persons with invasive meningococcal disease.

NORTH DAKOTA
DEPARTMENT of HEALTH

**Schedule for Administering Chemoprophylaxis for Meningococcal Disease***

| Drug | Age Group | Dosage | Duration | Administration |
|---|---|---|---|---|
| Rifampin[I] | Children aged < 1 month | 5mg/kg every 12 hours | 2 days | Oral |
| | Children aged ≥ 1 month | 10 mg/kg every 12 hours | 2 days | Oral |
| | Adults | 600 mg every 12 hours | 2 days | Oral |
| | | | | |
| Ceftriaxone (Rocephin®) | Children aged < 15 years | 125 mg | Single dose | IM[II] |
| | Adolescents and adults ≥ 15 years | 250 mg | Single dose | IM |
| | | | | |
| Azithromycin[III] | Children < 40 kg | 10 mg/kg | Single Dose | Oral |
| | Children ≥ 40 kg and Adults | 500 mg | Single Dose | Oral |
| | | | | |
| Ciprofloxacin[IV] | Adults ≥ 18 years | 500 mg | Single dose | Oral |
| | | | | |

*** Due to recent cases of cipro-resistant meningococcal serogroup B cases along the North Dakota/Minnesota border, the North Dakota Department of Health recommends that healthcare providers from the following counties: Barnes, Cass, Cavalier, Grand Forks, Nelson, Pembina, Ramsey, Ransom, Richland, Sargent, Steele, Traill, and Walsh discontinue the use of ciprofloxacin for chemoprophylaxis of contacts to meningococcal cases.**

**Source:** Centers for Disease Control and Prevention. Prevention and Control of Meningococcal Disease Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2005;54(No. RR-7):16.

**Meningococcal Disease (invasive) is a mandatory reportable condition in North Dakota. All suspect and confirmed cases should be reported immediately to the North Dakota Department of Health at 701.328.2378 or toll-free at 800.472.2180.**

[I] Rifampin is not recommended for pregnant women because the drug is teratogenic in laboratory animals. Because the reliability of oral contraceptives may be affected by rifampin therapy, alternative contraceptive measures should be considered while rifampin is being administered.
[II] Intramuscular.
[III] One recent study has reported that a single 500-mg oral dose of azithromycin was effective in eradicating nasopharyngeal carriage of *N. meningitidis* (*146*). Azithromycin, in addition to being safe and easy to administer, is also available in a suspension form and is approved for use among children. Further evaluation is warranted of both the effectiveness of azithromycin in eradicating carriage of *N. meningitidis* and potential for development of microbial resistance to this drug if it is widely used for chemoprophylaxis.
[IV] Ciprofloxacin is not generally recommended for persons < 18 years of age or for pregnant and lactating women because the drug causes cartilage damage in immature laboratory animals. However, ciprofloxacin can be used for chemoprophylaxis of children when no acceptable alternative therapy is available. Recent literature review identified no reports of irreversible cartilage toxicity or age-associated adverse events among children and adolescents (Source: Burstein GR, Berman SM, Blumer JL, Moran JS. Ciprofloxacin for the treatment of uncomplicated gonorrhea infection in adolescents: does the benefit outweigh the risk? *Clin Infect Dis* 2002;35:S191-9).

## Attachment 3. Summary of meningococcal conjugate vaccine recommendations, by risk group— Advisory Committee on Immunization Practices (ACIP), 2010.

| Risk group | Primary series | Booster dose |
|---|---|---|
| Persons aged 11 through 18 years | 1 dose, preferably at age 11 or 12 years | At age 16 years if primary dose at age 11 or 12 years |
| Persons aged 11 through 18 years | 1 dose, preferably at age 11 or 12 years | At age 16 through 18 years if primary dose at age 13 through 15 years |
| Persons aged 11 through 18 years | 1 dose, preferably at age 11 or 12 years | No booster needed if primary dose on or after age 16 years |
| HIV-infected persons in this age group | 2 doses, 2 months apart | At age 16 years if primary dose at age 11 or 12 years |
| HIV-infected persons in this age group | 2 doses, 2 months apart | At age 16 through 18 years if primary dose at age 13 through 15 years |
| HIV-infected persons in this age group | 2 doses, 2 months apart | No booster needed if primary dose on or after age 16 years |
| Persons aged 2 through 55 years with persistent complement component deficiency* or functional or anatomical asplenia | 2 doses, 2 months apart | Every 5 years |
| Persons aged 2 through 55 years with persistent complement component deficiency* or functional or anatomical asplenia | 2 doses, 2 months apart | At the earliest opportunity if a 1-dose primary series administered, then every 5 years |

| | | |
|---|---|---|
| Persons aged 2 through 55 years<br>with prolonged increased risk for<br>exposure† | 1 dose | Persons aged 2 through 6 years:<br>after 3 years |
| Persons aged 2 through 55 years<br>with prolonged increased risk for<br>exposure† | 1 dose | Persons aged 7 years or older:<br>after 5 years§ |

**Abbreviation: HIV = human immunodeficiency virus.**

*** Such as C5--C9, properidin, or factor D.**

**† Microbiologists routinely working with Neisseria meningitidis and travelers to or residents of countries where meningococcal disease is hyperendemic or epidemic.**

**§ If the person remains at increased risk.**

## Attachment 4. Licensed meningococcal vaccines — United States, 1981–2012

| Formulation | Type | Trade name | Manufacturer | Licensed (yr) | Age group | Dose(s) | Serogroups |
|---|---|---|---|---|---|---|---|
| MPSV4* | Polysaccharide | Menomune | Sanofi Pasteur | 1981 | ≥2 yrs | Single dose | A, C, W, and Y |
| MenACWY-D† | Conjugate | Menactra | Sanofi Pasteur | 2005 | 11–55 yrs | Single dose | A, C, W, and Y |
| MenACWY-D† | Conjugate | Menactra | Sanofi Pasteur | 2007 | 2–10 yrs | Single dose | A, C, W, and Y |
| MenACWY-D† | Conjugate | Menactra | Sanofi Pasteur | 2011 | 9–23 mos | 2-dose series | A, C, W, and Y |
| MenACWY-CRM§ | Conjugate | Menveo | Novartis | 2010 | 11–55 yrs | Single dose | A, C, W, and Y |
| MenACWY-CRM§ | Conjugate | Menveo | Novartis | 2011 | 2–10 yrs | Single dose | A, C, W, and Y |
| Hib-MenCY-TT¶ | Conjugate | MenHibrix | GlaxoSmithKline | 2012 | 6 wks–18 mos | 4-dose series | C and Y |

# Attachment 4: Data Elements Collected for Meningococcal Disease

A. Background (Cases and Contacts)
   a. Interviewer name
   b. County of interview
   c. Date of interview
   d. Case or contact interview
B. Source of report
   a. Active, surveillance, passive surveillance, lab
   b. Sporadic or outbreak associated
C. Demographics (Cases and Contacts)
   a. Name
   b. Address and county of residence
   c. Date of birth
   d. Age
   e. Sex
   f. Ethnicity
   g. Race
D. Clinical (Cases)
   a. Date of symptom onset
   b. Symptoms
      i. Initial
      ii. At time of interview
   c. Syndrome (meningitis, sepsis, pneumonia)
   d. Hospitalization date
   e. Complications
   f. Outcome (live or dead)
E. Laboratory (Cases and Contacts)
   a. Date test drawn and test type
   b. For culture, were antibiotics given before culture sample taken
   c. Serological test results
F. Status of Case or Contact
   a. Confirmed Case
   b. Contact
G. Known exposure to a confirmed case?

G. Risk factors for acquiring illness
   a. Household contact of case
   b. International travel
   c. Prolonged travel contact (plane, auto)
   d. Day care contact (employee, child)
   e. Other institutional contact
   f. Complement deficiency
   g. Asplenia
H. List of potential contacts
I. Vaccination status
   a. Number of doses of vaccine received
   b. Dates of last vaccination
   c. Type of vaccine received (conjugate, polysaccharide)
   d. Manufacturer name
   e. Vaccine lot number
   f. Location of vaccination if not U.S.
J. Outbreak Specific Information