



# Meningococcal Disease Information and Investigation Guidelines

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Note: The use of trade names in this document is for identification purposes only and does not imply endorsement by the Michigan Department of Health and Human Services. While every attempt has been made to accurately reflect the current recommendations related to meningococcal disease treatment and prevention, this document should not be considered a substitute for understanding and following the most up-to-date guidance materials. This document is not intended to replace clinical decision making.

## **1.) Disease Description**

Meningococcal disease usually presents clinically as one of three syndromes: meningitis, meningococemia (bacteremia), or bacteremic pneumonia. The two most common presentations are meningococcal meningitis accounting for around 50% of cases, and meningococemia accounting for approximately 37% of cases. Meningococcal meningitis is an inflammation of the meninges (the tissue that covers the brain and spinal cord), while meningococemia is an extremely severe, invasive infection of the blood stream. These disease presentations may occur independently or at the same time depending on the location of the bacteria in the body.

## **2.) Infectious Agent**

Meningitis can be caused by many different organisms, including bacteria, viruses, parasites, and fungi. Bacterial meningitis is generally more severe than viral meningitis. The term “meningococcal disease” refers only to disease caused by the bacteria *Neisseria meningitidis*; an aerobic, gram-negative, diplococcus. There are 13 serogroups of *N. meningitidis*. Serogroups A, B, C, Y, and W-135 account for nearly all cases of invasive disease worldwide. In the United States, serogroups B, C, and Y together account for over 90% of cases. The proportion of cases caused by each serogroup varies by age group. Serogroup B causes approximately 60% of cases among children less than 5 years old. Serogroups C, Y, and W, which are covered by meningococcal conjugate vaccines, cause approximately two out of three cases of meningococcal disease among persons 11 years old and older.

## **3.) Symptoms**

Meningococcal disease signs and symptoms can include: high fever, headache, stiff neck, photophobia, nausea/vomiting, hypotension, weakness, confusion, shock, and coma. A petechial rash and/or purpura fulminans (systemic peripheral gangrene) may be observed in cases of meningococemia. The rash develops rapidly and usually appears around the armpits, groin, and ankles. The rash may have macules or vesicles and does not fade when direct pressure is applied. Symptoms in infants may be difficult to notice or present differently from older children and adults. Fever, irritability, lethargy, vomiting, and refusing foods can all be symptoms of meningococcal disease in infants. Once clinical disease presents, symptoms may develop rapidly within a few hours, or over the course of 1-2 days.

## **4.) Incubation Period**

The time from exposure to the development of clinical symptoms can range from 2-10 days, usually 3-4 days. The vast majority of individuals who come into contact with the *N. meningitidis* bacteria will not develop meningococcal disease.

## **5.) Incidence**

Rates of meningococcal disease have been declining in the United States since the late 1990s. In 2013, there were approximately 550 total cases of meningococcal disease reported (rate of 0.18 cases per 100,000 population) in the United States. Meningococcal disease is seasonal. The occurrence of meningococcal disease is highest during the winter and spring with the number of cases generally peaking each year in January and February. The incidence of meningococcal disease is highest among infants and children less than 5 years old, adolescents and young adult aged 16-23 years, and adults 65 years and older. Rates of disease tend to decrease after infancy then increase during adolescence and young adulthood.

## **6.) Transmission**

The bacteria that cause meningococcal disease are contagious and spread from respiratory and nasopharyngeal secretions. Humans are the only reservoir. Fortunately, *N. meningitidis* bacteria are not as contagious as other respiratory pathogens such as rhinovirus (the common cold) and influenza virus. Most people exposed to *N. meningitidis* will not develop illness. Transmission of the bacteria on objects is generally not significant, although attention should be paid in daycares and other settings where children may place toys or other objects in their mouths. Casual contact is usually not enough to spread the bacteria to other individuals. Close, prolonged, or direct contact with oral or nasal secretions is necessary for transmission. Types of close contact include: kissing, sharing eating or drinking utensils, sharing cigarettes, performing CPR with breathing techniques, etc.

## **7.) Communicability**

Infection may be spread as long as there are live bacteria in nasal and throat secretions. A person is usually considered infectious 7-10 days prior to symptom onset until 24 hours after appropriate antibiotic therapy is started. Bacteria are generally no longer present in the nasopharyngeal tract after 24 hours of appropriate antibiotic therapy. Hospitalized cases should be placed under droplet precautions until 24 hours of appropriate treatment has been completed.

## **8.) Groups with Increased Risk for Disease**

- Household contacts of case patients and people with direct contact to case patient's oral and nasal secretions
- Infants
- People with concurrent or recent viral respiratory infections
- Individuals in crowded living situations such as multiple families living in a single unit, homeless shelters, or refugee camps
- Individuals with chronic illness
- People in group living situations, such as a college dormitory or military barracks
- People with immune deficiencies, those on medications that suppress immune function, or patients without spleens
- Individuals with active or passive exposure to smoking
- Travelers to areas with high levels of endemic or epidemic meningococcal disease
- Microbiologists or laboratorians who work with the *N. meningitidis* bacteria

## **9.) Severity**

Nearly all untreated cases of meningococcal disease result in death. Despite the susceptibility of the *N. meningitidis* bacteria to many common antibiotics, even with treatment 10-15% of cases are fatal. Among those who survive infection, 11-19% will have long-term adverse effects (e.g., brain damage, hearing loss, loss of limb use, etc.)

## **10.) Diagnosis**

CSF from a lumbar puncture (LP or spinal tap) in conjunction with a blood isolate are the primary specimens used to diagnose meningococcal disease. Unless contraindicated, a lumbar puncture and blood sample should be taken immediately prior, or concurrently to starting antibiotic therapy. CSF and blood cultures should be started as soon as possible to attempt to identify the infectious agent, as results may take up to 48 hours. Gram stains should immediately be done in effort to visualize the diplococci bacteria.

In the event a lumbar puncture is delayed, a blood specimen should be drawn followed by the initiation of antibiotic therapy before a CT scan is performed. The administration of antibiotics prior to collecting samples may result in no culture growth. In this case, other clinical and laboratory evidence can still be used to determine the likely cause of disease. CSF from a bacterial meningitis case may appear cloudy or milky, have increased protein, decreased glucose, and a high number of white blood cells (neutrophils usually predominate). PCR and latex agglutination may also be of use in cases suspected to be culture-negative due to the prior administration of antibiotics. Blood, CSF, or other sterile site isolates are required to be submitted to the Michigan Department of Health and Human Services (MDHHS) Bureau of Laboratories (BoL) for serogrouping from every case of meningococcal disease in Michigan. Additional information can be found at: <http://www.michigan.gov/mdhhs/lab>

## **11.) Case Definition**

MDHHS uses the case definition for meningococcal disease developed by the Centers for Disease Control and Prevention (CDC). Normally sterile sites include: CSF, blood, joint fluid, pleural fluid, and pericardial fluid. Isolation from non-sterile sites such as urine, sputum, or nasopharyngeal samples does not meet the case definition. Approximately 5-10% of the population asymptotically carries *N. meningitidis* in their noses and throats; nasopharyngeal colonization is not considered invasive disease. Carriage is generally transient and usually resolves within several weeks.

### **Confirmed:**

- Isolation of *Neisseria meningitidis* from a normally sterile body site or from purpuric lesions; or
- Detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile body site, using a validated polymerase chain reaction (PCR) assay

### **Probable:**

- detection of *N. meningitidis* antigen
  - in formalin-fixed tissue by immunohistochemistry (IHC); or
  - in CSF by latex agglutination

### **Suspect:**

- 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

## **12.) Case Treatment**

Appropriate antibiotic therapy should be started as soon as possible, at most within 24 hours of diagnosis. A table of appropriate therapy based on the clinical and laboratory findings available at the time of therapy initiation can be found below for bacterial meningitis. The normal duration of therapy for bacterial meningitis caused by *N. meningitidis* is at least 7 days, depending on the patient's clinical response. If rifampin, ceftriaxone or ciprofloxacin (which are effective against colonization) were not used during treatment, the patient should also be chemoprophylaxed with an effective antibiotic before hospital discharge to eliminate *N. meningitidis* nasopharyngeal carriage.

**Table 1: Recommended Antibiotic Therapy Based on Clinical and Laboratory Information Available at the Initiation of Treatment for Bacterial Meningitis**

<b>Clinical / Laboratory Findings</b>	<b>Recommended Therapy</b>	<b>Alternative Therapies</b>
Bacterial meningitis suspected, no lumbar puncture (LP) or LP delayed	Vancomycin plus a 3rd generation cephalosporin (ceftriaxone or cefotaxime)	In those > 50 years: vancomycin plus ampicillin plus 3rd generation cephalosporin
Presumptive identification of <i>N. meningitidis</i> from gram stain	Ceftriaxone or cefotaxime	Penicillin G, ampicillin, chloramphenicol, fluoroquinolone, or aztreonam
<i>N. meningitidis</i> isolated and susceptibility testing completed	If penicillin MIC <0.1 µg/mL: penicillin G or ampicillin	Ceftriaxone, cefotaxime, or chloramphenicol
	If penicillin MIC 0.1-1.0 µg/mL: ceftriaxone or cefotaxime	Chloramphenicol, fluoroquinolone, or meropenem

**Note:** According to the Infectious Diseases Society of America (IDSA) these guidelines are intended to assist practitioners in making decisions about appropriate health care and are not intended to replace the physician's judgment with respect to certain patients or special clinical situations.

Table adapted from: IDSA Guidelines- Tunkel et al. Practice Guidelines for the Management of Bacterial Meningitis. Clinical Infectious Disease 2004;39 (1267-1284)

## **13.) Contact Prophylaxis**

Antibiotic prophylaxis (chemoprophylaxis) is recommended for close contacts who have had direct contact with the case patient during the 10 days prior to illness onset and up to 24 hours after appropriate antibiotic therapy was started. Prophylaxis for contacts should ideally be started within 24 hours of the case patient's diagnosis (clinical or laboratory). Prophylaxis administered greater than 14 days after last exposure to the case while infectious is not considered beneficial. Generally, prophylaxis is not necessary for casual contacts in classrooms or work environments, or for emergency response professionals who have used standard precautions. Due to the rate of asymptomatic carriage of *N. meningitidis*, nasal swab screening is not considered useful in determining the need for prophylaxis or treatment. All contacts should be advised to monitor for the development of symptoms consistent with meningococcal disease, particularly fevers, rashes, and severe headache. Signs and symptoms will generally present within 2 weeks, but a small risk of disease may persist for up to 2 months. Chemoprophylaxis is recommended for all close contacts, even those who have received meningococcal immunization(s) in the past.

## **13.) Contact Prophylaxis cont.**

### **13.1) Close Contact Examples:**

- Household members or anyone who has slept in the same household as the case-patient
- Daycare or childcare contacts, includes staff and attendees
- People who have had direct contact with oral or nasal secretions from the case-patient
- People who have shared food, beverage, toothbrush, eating utensils, or cigarettes with the case-patient
- Individuals who have provided direct patient care for 4 or more hours during the infectious period
- Medical personnel who have had direct, unprotected contact with oral or nasal secretions such as performing CPR with airway support or intubation
- Anyone seated directly next to a case on a prolonged airline flight or other mode of transportation ( $\geq 8$  hours)

### **13.2) Persons/settings to Consider and Evaluate for Contact Follow-up and Prophylaxis:**

- Family
- Friends
- Roommates
- Boyfriend / girlfriend / intimate partners
- Place of employment
- School (close friends of older children, generally not the entire classroom)
- Daycare
- Before or after school care programs
- Social gatherings (particularly parties where drinking and sharing of cigarettes or other drugs may have occurred)
- Extracurricular and sports events
- Church groups
- Hospital and emergency medical personnel
- Seat mates with extended contact ( $\geq 8$  hours) on transportation (plane, bus, etc.)

### 13.) Contact Prophylaxis cont.

**Table 2: Recommendations for Chemoprophylaxis Against Meningococcal Disease in Close Contacts**

Drug	Age Group	Dosage	Duration and Route of Administration
Rifampin*	Children < 1 month old	5 mg/kg body weight every 12 hrs	2 days, oral administration
	Children ≥ 1 month old	10 mg/kg body weight every 12 hrs (max 600 mg/dose)	2 days, oral administration
	Adults (≥ 18 years old)	600 mg every 12 hrs	2 days, oral administration
Ciprofloxacin**	Adults (≥ 18 years old)	500 mg	Single dose, oral administration
Ceftriaxone	Children < 15 years old	125 mg	Single intramuscular dose
	Adults (≥ 15 years old)	250 mg	Single intramuscular dose

\*Rifampin is **not** recommended for pregnant women. It may also decrease the reliability of oral contraceptives.

\*\*Ciprofloxacin is **not** recommended for pregnant / lactating women and is generally not recommended for persons <18 years old. May be considered for use in children when no alternative therapy is available.

Table adapted from: Prevention and Control of Meningococcal Disease. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2013; 62; No. 2

### **13.3) Meningococcal pneumonia**

Currently, in the United States, there are no definitive guidelines regarding prophylaxis for close contacts exposed to a meningococcal pneumonia case. Prophylaxis should be given to close contacts of a meningococcal pneumonia case with invasive disease, where *N. meningitidis* is isolated from a sterile site (blood, CSF, joint, etc.) The recommendations are less clear when a case has clinically compatible disease, but *N. meningitidis* is isolated from only a sputum specimen. High rates of asymptomatic carriage in the nasopharyngeal tract make it difficult to determine whether the illness, in the absence of sterile site cultures, is truly due to *N. meningitidis*. Transmission of *N. meningitidis* due to meningococcal pneumonia appears to be rare and generally prophylaxis is not routinely recommended. However, with the absence of CDC or clinical practice standard guidelines, in cases of suspected meningococcal pneumonia without clear evidence of invasive disease, physicians and public health professionals should use their best judgment when deciding whether the prophylaxis of close contacts is appropriate.

## **14.) Disease Prevention**

There are several ways to reduce the risk of meningococcal disease including: the use of meningococcal vaccine for appropriate groups; not sharing drinking glasses, water bottles, eating utensils, cigarettes, cosmetics or balms for the lips; stop smoking/avoid exposing children to second-hand smoke; and avoiding contact with oral and nasal secretions of ill individuals. Frequent hand washing should be encouraged. Staying up-to-date on recommended vaccinations for other respiratory diseases such as influenza and pneumococcal disease may also provide some degree of protection.

### **14.1) Meningococcal Vaccines**

Six meningococcal vaccines are available in the U.S. against *N. meningitidis*: three quadrivalent vaccines effective against serogroups A, C, Y, and W-135 (Menveo®, Menactra®, and Menomune®); a bivalent meningococcal combination vaccine effective against *Haemophilus influenzae* type b (Hib) and meningococcal serogroups C and Y (MenHibrix®); and two recombinant vaccines specific for *N. meningitidis* serogroup B (Trumenba® and Bexsero®).

- **Menveo®** (MenACWY-CRM)- Meningococcal conjugate vaccine, licensed in 2010
  - effective against *N. meningitidis* serogroups A, C, W-135, and Y
  - approved for use in people ages 2-55 years old as a single dose
  - licensed as a four-dose series for ages 2-23 months old, who are at increased risk of meningococcal disease
- **Menactra®** (MenACWY-D)- Meningococcal conjugate vaccine, licensed in 2005
  - effective against *N. meningitidis* serogroups A, C, W-135, and Y
  - approved for use in people ages 2-55 years old as a single dose
  - licensed as a two-dose series for ages 9-23 months old who are at increased risk of meningococcal disease
- **Menomune®** (MPSV4)- Meningococcal polysaccharide vaccine, licensed in 1981
  - effective against *N. meningitidis* serogroups A, C, W-135, and Y
  - only vaccine approved for use in people ≥ 56 years old
  - may be given to pregnant women if deemed necessary by a physician
  - may be given to individuals aged 2-55 years if both Menveo® and Menactra® are contraindicated or unavailable, and the need is urgent
- **MenHibrix®** (Hib-MenCY-TT)- Meningococcal and *Haemophilus b* tetanus toxoid conjugate vaccine, licensed in 2012
  - effective against Hib and *N. meningitidis* serogroups C and Y
  - approved as a four-dose series for use in children aged 6 weeks-18 months who are at increased risk of meningococcal disease
- **Trumenba®** (MenB-FHbp)- Meningococcal recombinant vaccine, licensed in 2014
  - effective against *N. meningitidis* serogroup B
  - approved for use in people 10- 25 years of age as a two or three-dose series
- **Bexsero®** (MenB-4C)- Meningococcal recombinant vaccine, licensed in 2015
  - effective against *N. meningitidis* serogroup B
  - approved for use in people 10- 25 years of age as a two-dose series



## 14.) Disease Prevention cont.

### 14.2) Advisory Committee on Immunization Practices (ACIP) ACWY (Non-Group B) Meningococcal Vaccine Guidelines

For the most current vaccination recommendations, visit:

<http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html>

#### **Individuals recommended to be vaccinated for meningococcal disease with ACWY vaccine:**

- All adolescents aged 11-18 years old
- Children aged 2 months-10 years old with certain high-risk conditions
- Persons aged 19 - 55 years old who meet one of the following conditions: live in a college dormitory, are military recruits, have a damaged or removed spleen, have terminal complement component deficiency, are HIV-infected, are microbiologists working with *N. meningitidis*, or are traveling/reside in an area with hyperendemic or epidemic meningococcal disease
- Individuals in a defined risk group exposed to a meningococcal disease outbreak

#### **Routine Vaccination of Adolescents (Table 3)**

Current meningococcal ACIP guidelines recommend routine vaccination with one of the meningococcal conjugate vaccines, Menactra or Menveo, at age 11 or 12 years with a booster dose at age 16 years. Adolescents who receive their first dose of meningococcal vaccine at age 13-15 years should receive a single booster dose between the ages of 16-18 years. Individuals who receive their first dose of vaccine on or after age 16 do not need a booster dose, unless they become at increased risk for meningococcal disease. Individuals aged 19-21 years are generally not recommended to routinely receive vaccination, but may be vaccinated with Menactra® or Menveo® up to age 21 years as a catch-up vaccination for those who have not received a dose after their 16<sup>th</sup> birthday. Routine vaccination of healthy individuals who are not at increased risk for meningococcal disease is not recommended for children aged 2 months-10 years or after age 21 years.

**Table 3: Summary of ACIP ACWY (Non-Group B) Meningococcal Vaccine Recommendations**

Routine Vaccination of Healthy Adolescents			
Age Group	Risk Group	Primary Vaccination	Booster Dose
11 - 21 years old	Normal health	Menactra® or Menveo®: At age 11-12 years: 1 dose At age 13-18 years: 1 dose, if not vaccinated previously	One booster dose recommended if first dose administered before 16 <sup>th</sup> birthday
		At age 19-21 years: not routinely recommended, but 1 dose may be administered as a catch-up vaccination for those who have not received a dose after their 16 <sup>th</sup> birthday	No booster if primary dose given on or after age 16 years

**Note: For those aged 2 months-10 years, 22-55 years, or ≥ 56 years; vaccination is not routinely recommended. See Tables 4 and 5 below for recommendations regarding individuals with an increased risk of disease.**

Table adapted from: Prevention and Control of Meningococcal Disease. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2013; 62; No. 2

## 14.2) Advisory Committee on Immunization Practices (ACIP) ACWY (Non-Group B) Meningococcal Vaccine Guidelines cont.

### *Vaccination Recommendations for Special Populations and Persons at Increased Risk (Tables 4 and 5)*

#### **Age-based primary vaccination recommendations**

- Infants aged 2-18 months at increased risk for meningococcal disease are recommended to receive a four-dose primary series of MenHibrix® given at ages 2, 4, 6, and 12-15 months. The first dose may be administered as early as 6 weeks old and the fourth dose may be given as late as 18 months. If the first dose of MenHibrix® is administered at or after 12 months of age, a two-dose series is recommended with the first and second dose given at least 8 weeks apart. MenHibrix® can be co-administered with other routine infant vaccinations, except other Hib-containing vaccines. MenHibrix® should not be used for subsequent booster doses; Menveo® or Menactra® should be used.
- Infants aged 2-23 months at increased risk for meningococcal disease not previously vaccinated with MenHibrix® may receive a four-dose primary series of Menveo® given at ages 2, 4, 6, and 12 months. If the first dose of Menveo® is administered at 7-23 months of age, the child should receive a two-dose series with the second dose administered at  $\geq 12$  months of age and  $\geq 3$  months after the first dose.
- Persons aged 9 months-55 years with increased risk for meningococcal disease should receive Menactra® or Menveo® depending on their age and risk group. Children aged 9-23 months should be vaccinated with a two-dose primary series of Menactra®, spaced 12 weeks apart. Children who received the MenHibrix® primary series do not need to also receive primary Menveo® or Menactra® unless they are traveling to an area with a high endemic rate or epidemic of meningococcal disease. Persons 2-55 years old are recommended to receive either a single dose or a two-dose primary series depending upon the reason for vaccination.
- Persons aged  $\geq 56$  years old at increased risk for meningococcal disease who have not previously been vaccinated for meningococcal disease should receive a single dose of Menomune®, except for HIV-infected persons. HIV-infected persons aged  $\geq 56$  years should receive Menactra® or Menveo® for their primary and booster doses. For persons now aged  $\geq 56$  years old who were previously vaccinated with Menactra® or Menveo® and are recommended for vaccination where multiple doses are anticipated should continue to receive the type of vaccine, Menactra® or Menveo®, which they received previously.

#### **Condition-based recommendations**

- *Persons with persistent complement component deficiencies (C<sub>3</sub>, C<sub>5-9</sub>, properdin, factor D, and factor H), including individuals taking eculizumab (Soliris®):* For ages 9 months-55 years, a two-dose series of either Menactra® or Menveo® administered 8-12 weeks apart is recommended. A four-dose series of MenHibrix® can be administered to infants aged 2-18 months. A booster dose should be administered every 5 years. Children who received the last dose of a meningococcal vaccine primary series before their 7<sup>th</sup> birthday should receive their first booster dose 3 years after completion of the primary series and subsequent boosters every 5 years after that.

### **Condition-based recommendations cont.**

- *Persons with anatomic or functional asplenia, including those with sickle cell disease:* For individuals 2-55 years old, a two-dose primary series of Menactra® or Menveo® administered 8-12 weeks apart is recommended. For infants aged 2-18 months old, a four-dose primary series of MenHibrix® should be administered. Children aged 9-23 months who have not previously received MenHibrix® may be vaccinated with Menveo® as it does not interfere with the immune response to pneumococcal vaccination (PCV13). The use of Menactra® should be deferred until age 2 years, and after the completion of the pneumococcal vaccination series. A booster dose should be administered every 5 years. Children who received the last dose of a meningococcal vaccine primary series before their 7<sup>th</sup> birthday should receive their first booster dose 3 years after completion of the primary series and subsequent boosters every 5 years after that.
- *First-year college students living in residence halls:* Individuals should receive at least one dose of Menactra® or Menveo® before college entry, preferably on or after their 16<sup>th</sup> birthday. If only one dose of vaccine was administered before the 16<sup>th</sup> birthday, a booster dose should be administered before enrollment. Because many colleges and universities now require meningococcal vaccination, persons aged ≤ 21 years old should have documentation of receipt of Menactra® or Menveo® not more than 5 years before enrollment.
- *Microbiologists routinely exposed to isolates of N. meningitidis:* Individuals should receive a single dose of Menactra® or Menveo®. A booster dose should be given every 5 years if the exposure is ongoing.
- *Persons who travel or reside in countries where meningococcal disease is hyperendemic or epidemic (sub-Saharan Africa during December-June; Mecca, Saudi Arabia during Hajj; other countries with epidemic travel advisories):* International travelers should receive a booster dose of Menactra® or Menveo® if the last dose was 5 years or more previously (note: travelers to Mecca during the Hajj are required by the government of Saudi Arabia to have a vaccination within the 3 years before the date of travel). Children aged 9-23 months can receive their second dose of the primary series as early as 8 weeks after the first dose before travel. Infants and children who received MenHibrix® and are traveling to hyperendemic/epidemic areas should receive 1 or 2 doses of Menactra® or Menveo® (dependent upon age and vaccination product) before travel to protect against serogroups A and W-135, which are not covered by MenHibrix®. Travel information and advisories can be found at [www.cdc.gov/travel](http://www.cdc.gov/travel).
- *Persons with Human Immunodeficiency Virus:* All HIV-infected persons aged ≥2 months should routinely receive meningococcal conjugate vaccine; children aged <2 years should be vaccinated using a multi-dose schedule of Menveo®. Persons aged ≥2 years with HIV who have not been previously vaccinated should receive a 2-dose primary series of meningococcal conjugate vaccine. Persons with HIV who have been previously vaccinated with meningococcal conjugate vaccine should receive a booster dose at the earliest opportunity (at least 8 weeks after the previous dose) and then continue to receive boosters at the appropriate intervals. If the most recent dose was received before age 7 years, a booster dose should be administered 3 years later. If the most recent dose was received at age ≥7 years, a booster should be administered 5 years later and every 5 years thereafter throughout life.

**Vaccination Recommendations for Special Populations and Persons at Increased Risk (Tables 4 and 5) cont.**

**Table 4: Summary of ACIP ACWY (Non-Group B) Meningococcal Vaccine Recommendations**

**Vaccination Options of Children Aged 2-23 Months at Increased Risk of Meningococcal Disease**

Age Group	Risk Group	Primary Vaccination	Booster Dose*
2-18 months old	<p><u>Child with high-risk conditions:</u></p> <ul style="list-style-type: none"> <li>• have functional or anatomic asplenia<sup>¶</sup></li> <li>• persistent complement deficiencies<sup>§</sup></li> <li>• are in the risk group for an outbreak where vaccination is recommended</li> </ul>	<p>MenHibrix®*:</p> <p>4 doses given at: 2, 4, 6, and 12-15 months of age</p>	<p>If the most recent meningococcal vaccine dose was received before age 7 years, and increased risk for meningococcal disease remains:</p> <p>the child should receive a booster dose of Menactra® or Menveo® 3 years after the last primary vaccination and additional boosters should be repeated every 5 years thereafter</p>
2-23 months old	<p><u>Child with high-risk conditions:</u></p> <ul style="list-style-type: none"> <li>• have functional or anatomic asplenia<sup>¶</sup></li> <li>• persistent complement deficiencies<sup>§</sup></li> <li>• HIV-infected</li> <li>• traveling to or residing in regions where meningococcal disease is hyperendemic/epidemic</li> <li>• are in the risk group for an outbreak where vaccination is recommended</li> </ul>	<p>Menveo®</p> <p>4 doses given at: 2, 4, 6, and 12 months of age</p>	
9 - 23 months old	<p><u>Child with high-risk conditions:</u></p> <ul style="list-style-type: none"> <li>• persistent complement deficiencies<sup>§</sup></li> <li>• traveling to or residing in regions where meningococcal disease is hyperendemic/epidemic</li> <li>• are in the risk group for an outbreak where vaccination is recommended</li> </ul>	<p>Menactra®**:</p> <p>2 doses given at 9 and 12 months of age</p> <p>Note: The 2 doses should be administered 12 weeks apart. If a child is receiving vaccine prior to travel, the 2nd dose may be administered as early as 8 weeks after the first dose.</p>	

<sup>¶</sup>Including those with sickle cell disease

<sup>§</sup>Including inherited/chronic deficiencies in C<sub>3</sub>, C<sub>5-9</sub>, properdin, factor D, and factor H, or those taking eculizumab (Soliris®)

\*Children who previously received MenHibrix® and are traveling to areas with hyperendemic/epidemic rates of meningococcal disease are not protected against serogroups A and W-135. Those <9 months of age should receive Menveo® before travel. Children aged ≥ 9 months should receive either Menactra® or Menveo® (dependent upon high-risk condition and previous vaccine products) prior to travel.

\*\*Because of the high-risk for invasive pneumococcal disease, children with functional or anatomic asplenia or HIV Infection should not be immunized with Menactra® before age 2 years to avoid interference with the immune response to the pneumococcal conjugate vaccine (PCV13). If Menactra® is used in an HIV-infected child < 2 years of age, it should be administered at least 4 weeks after completion of all pneumococcal conjugate vaccine doses. If Menactra® is to be administered to a child of any age at increased risk of meningococcal disease, it is recommended that Menactra® be given either before DTaP or concomitantly with DTaP.

\*MenHibrix® should not be used for booster doses after the primary series. Menactra® or Menveo® should be used for booster doses.

Table adapted from: Prevention and Control of Meningococcal Disease. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2013; 62; No. 2 / Use of MenACWY-CRM Vaccine in Children Aged 2 Through 23 Months at Increased Risk for Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2013. MMWR 2014; 63(24); 527-530 / Recommendations for Use of Meningococcal Conjugate Vaccines in HIV-Infected Persons - Advisory Committee on Immunization Practices (ACIP), 2016. MMWR 2014; 65(43):1189-1194.

**Vaccination Recommendations for Special Populations and Persons at Increased Risk (Tables 4 and 5) cont.**

**Table 5: Summary of ACIP ACWY (Non-Group B) Meningococcal Vaccine Recommendations**

**Vaccination of Individuals Aged ≥2 Years at Increased Risk of Meningococcal Disease**

Age Group	Risk Group	Primary Vaccination	Booster Dose
2 - 55 years old, not previously vaccinated	<p><u>Individuals with high-risk conditions:</u></p> <ul style="list-style-type: none"> <li>• have functional or anatomic asplenia<sup>¶</sup></li> <li>• persistent complement deficiencies<sup>§</sup></li> <li>• HIV-infected</li> </ul>	<p>Menactra®* or Menveo®: 2 doses, 8 - 12 weeks apart</p>	<p>If the person remains at increased risk for meningococcal disease, and completed the primary dose or series at age:</p> <p><u>≤6 years:</u> Individual should receive a booster dose of Menactra® or Menveo® 3 years after the last primary vaccination; additional boosters should be repeated every 5 years thereafter</p> <p><u>≥7 years:</u> Individual should receive a booster dose of Menactra® or Menveo® 5 years after the last primary vaccination; additional boosters should be repeated every 5 years thereafter</p>
	<p><u>Individuals who are:</u></p> <ul style="list-style-type: none"> <li>• first year college students aged ≤ 21 years living in residential housing</li> <li>• traveling to or are residents of countries where meningococcal disease is hyperendemic/epidemic</li> <li>• at risk during a community outbreak attributable to a vaccine serogroup</li> <li>• microbiologists routinely exposed to isolates of <i>N. meningitidis</i></li> </ul>	<p>Menactra®* or Menveo®: 1 dose</p>	

<sup>¶</sup>Including those with sickle cell disease

<sup>§</sup>Including inherited/chronic deficiencies in C<sub>3</sub>, C<sub>5-9</sub>, properdin, factor D, and factor H, or those taking eculizumab (Soliris®)

\*If Menactra® is used it should be administered at least 4 weeks after completion of all pneumococcal conjugate vaccine doses

Table adapted from: Prevention and Control of Meningococcal Disease. Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2013; 62; No. 2 / Use of MenACWY-CRM Vaccine in Children Aged 2 Through 23 Months at Increased Risk for Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2013. MMWR 2014; 63(24); 527-530 / Recommendations for Use of Meningococcal Conjugate Vaccines in HIV-Infected Persons - Advisory Committee on Immunization Practices (ACIP), 2016. MMWR 2014; 65(43):1189-1194

## **14.) Disease Prevention Cont.**

### **14.3) Advisory Committee on Immunization Practices (ACIP) Group B Meningococcal (MenB) Vaccine Guidelines (Table 6)**

For the most current vaccination recommendations, visit:

<http://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mening.html>

In recent years, multiple U.S. college campus outbreaks of serogroup B meningococcal disease, for which the ACWY meningococcal vaccinations are not effective, prompted the Food and Drug Administration (FDA) to license two serogroup B vaccines based on statutory regulations for accelerated approval. In October 2014, the FDA licensed Trumenba® for use in people 10–25 years of age as a three-dose series. In May, 2017 the Trumenba® dosage recommendations were updated to a two or three-dose series depending upon reason for vaccination. In January 2015, the FDA licensed Bexsero® for use in people 10–25 years of age as a two-dose series. The two MenB vaccines are not interchangeable; the same vaccine product must be used for all doses. Based on current data, MenB vaccines may be administered at the same time as other age-appropriate vaccinations, but should be injected into a separate anatomic site, if possible. The safety of MenB vaccines in pregnant or lactating women has not been established. MenB vaccination should be deferred in pregnant or lactating women unless the woman is at increased risk of meningococcal disease and her health care provider has determined the benefit of vaccination outweighs the potential risks.

Meningococcal serogroup B vaccination is now routinely recommended for those ≥10 years of age who are at increased risk for meningococcal disease. These individuals include: those with complement deficiencies, anatomic or functional asplenia, microbiologists who routinely have contact with *N. meningitidis*, and others at increased risk during a serogroup B meningococcal disease outbreak. Individuals taking eculizumab (Soliris®) are also now included in the category of “complement component deficiencies”. A MenB vaccine series may be administered to individuals aged 16-23 years-old to provide short term protection against serogroup B meningococcal disease. The preferred age for vaccination with MenB vaccine is 16-18 years old. Serogroup B vaccination is not currently routinely recommended for incoming college students unless there is a meningococcal disease outbreak at the institution. However, current CDC guidelines allow for individual clinical decision making in regards to serogroup B vaccination of those 16-23 years of age.

### 14.3) Advisory Committee on Immunization Practices (ACIP) Group B Meningococcal (MenB) Vaccine Guidelines (Table 6) cont.

Table 6: Summary of ACIP Group B Meningococcal (MenB) Vaccine Recommendations		
Age Group	Risk Group	MenB Vaccination
≥10 years old	<p><u>Individuals with high risk conditions:</u></p> <ul style="list-style-type: none"> <li>• persistent complement component deficiencies<sup>§</sup></li> <li>• anatomic or functional asplenia<sup>¶</sup></li> <li>• microbiologists routinely exposed to isolates of <i>Neisseria meningitidis</i></li> <li>• persons identified as at increased risk because of a serogroup B meningococcal disease outbreak</li> </ul>	<p>Trumenba®: Three-dose series, with the second and third doses given 1-2 months and 6 months, respectively, after the first dose. However, if the second dose is administered 6 months or later after the first dose, a third dose is not needed.</p> <p style="text-align: center;"><b>Or</b></p> <p>Bexsero®: Two-dose series, with doses given at least 1 month apart</p>
16-23 years old (preferred age: 16-18 years)	<p>A serogroup B meningococcal (MenB) series may be administered to persons aged 16-23 years old to provide short-term protection against most strains of serogroup B meningococcal disease*</p>	<p>Trumenba®: Two-dose series, with the second dose given 6 months after the first. However, if the second dose is given earlier than 6 months after the first dose, a third dose should be administered at least 4 months after the second dose</p> <p style="text-align: center;"><b>Or</b></p> <p>Bexsero®: Two-dose series, with doses given at least 1 month apart</p>
<p><sup>§</sup>Including inherited/chronic deficiencies in C<sub>3</sub>, C<sub>5-9</sub>, properdin, factor D, and factor H, or those taking eculizumab (Soliris®)</p> <p><sup>¶</sup>Including those with sickle cell disease</p> <p>*Category B ACIP recommendation made for individual clinical decision making</p> <p>Table adapted from: Use of Serogroup B Meningococcal Vaccines in Adolescents and Young Adults: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 2015: 64(41); 1171-1176 and Updated Recommendations for Use of MenB-FHbp Serogroup B Meningococcal Vaccine — Advisory Committee on Immunization Practices, 2016. MMWR 2017: 66(19); 509–513</p>		

### 14.4) Vaccination contraindications and adverse events

Meningococcal vaccine is contraindicated in individuals who have had a severe (life-threatening) allergic reaction to previously administered meningococcal vaccine or any other vaccine component. People who have ever had Guillain-Barré Syndrome should consult with their doctor prior to getting vaccinated, but it is no longer considered a contraindication or precaution to vaccination. Individuals who are moderately or severely ill should wait until they are recovered to receive meningococcal vaccine; those with mild illness can usually be vaccinated.

Most people will have no adverse effects from meningococcal vaccine. Some individuals will develop mild redness or pain at the injection site or a low grade fever. These side effects generally resolve after 1-2 days. Serious allergic reactions to the meningococcal vaccines are rare. Adverse events occurring after administration of any vaccine should be reported to the Vaccine Adverse Event Reporting System (VAERS): <http://vaers.hhs.gov>.



## **14.5) Vaccination standing orders**

Standing orders for the administration of meningococcal vaccine can be found on the Immunization Action Coalition's website at [www.immunize.org](http://www.immunize.org). Specific links to the standing orders documents can be found below.

Standing Orders for Administering Meningococcal Vaccine (ACWY) to Children & Teens  
<http://www.immunize.org/catg.d/p3081a.pdf>

Standing Orders for Administering Meningococcal Vaccine (ACWY) to Adults  
<http://www.immunize.org/catg.d/p3081.pdf>

Standing Orders for Administering Meningococcal B Vaccine to Adolescents and Adults  
<http://www.immunize.org/catg.d/p3095.pdf>

Proper vaccine storage and handling guidance for meningococcal vaccines can be found at: [http://www.immunize.org/packageinserts/pi\\_meningococcal.asp](http://www.immunize.org/packageinserts/pi_meningococcal.asp) and [http://www.immunize.org/packageinserts/pi\\_meningococcal\\_b.asp](http://www.immunize.org/packageinserts/pi_meningococcal_b.asp)

## **15.) Surveillance for Outbreaks**

In the U.S., >98% of meningococcal disease cases are sporadic. In order to ascertain whether an outbreak is occurring, clinical samples must be collected to determine the serogroup of *N. meningitidis* causing disease and, if warranted, to conduct pulsed field gel electrophoresis (PFGE). Outbreaks will be caused by a single serogroup and are generally very closely related strains.

Guidelines to assist in determining whether an outbreak is occurring include: at least 3 or more confirmed or probable primary cases (no known exposure to another case of meningococcal disease) in a time period of less than 3 months, with a resulting primary attack rate of greater than 10 cases per 100,000 population. Please contact the MDHHS Communicable Disease Division immediately at 517-335-8165 or after business hours at 517-335-9030, if you suspect an outbreak of meningococcal disease. The use of MenACWY or MenB vaccine for prophylaxis may be considered in outbreak situations. A defined population must be determined and consultation with the local and state health departments should occur prior to undertaking any vaccination efforts.

Because up to 5-10% of people carry *N. meningitidis* asymptomatically in their nasopharynx, screening with nasopharyngeal swabs of asymptomatic individuals is not recommended in routine case contact investigations or outbreak settings. Only a small percentage (<1%) of asymptomatic carriers will go on to develop invasive disease.

## **16.) Investigation Roles and Responsibilities**

### **16.1) Physicians and Infection Control:**

- Report any suspect or confirmed meningococcal case as soon as possible, and within 24 hours, to the local health department jurisdiction where the case patient resides.
- Administer chemoprophylaxis to exposed on-site health care workers and emergency personnel (e.g. EMTs or paramedics), as appropriate.
- Confirm your laboratory will submit the mandatory isolates, if available, from blood or CSF to the Michigan Department of Health and Human Services Bureau of Laboratories for *N. meningitidis* serogroup typing. Instructions for sample submission can be found at: [http://www.michigan.gov/documents/LSGNeisseria\\_Referred\\_Cultures\\_8258\\_7.doc](http://www.michigan.gov/documents/LSGNeisseria_Referred_Cultures_8258_7.doc)



- Ensure terminal prophylaxis to eliminate nasopharyngeal carriage of *N. meningitidis* in case patient prior to discharge. Third-generation cephalosporins (ceftriaxone or cefotaxime) or ciprofloxacin are effective.
- From 2007-2008, 3 cases of infection with ciprofloxacin resistant *N. meningitidis* were reported in the U.S. While widespread resistance does not appear to be a concern at this time, physicians should report any suspected chemoprophylaxis failures as soon as possible to the local health department.

### **16.2) Local Health Departments:**

- Begin follow-up investigation as soon as possible and within 24 hours of case notification.
- Enter the meningococcal disease case into MDSS as soon as possible and within 24 hours of first report from the physician or laboratory. Use the Meningococcal Disease case report form.
- Conduct case investigation and interview of case-patient, parents, or others able to provide contact information. For adolescent and young adults, friends may be a good source of information as parents may not be aware of all direct contacts.
- Identify close contacts and recommend appropriate prophylaxis, the goal should be to identify all close contacts within 24 hours of case report.
- Advise close contacts to visit their health care provider to receive chemoprophylaxis. Help arrange chemoprophylaxis, as needed, for those without health care access.
- Communicate with providers to ensure appropriate prophylaxis of on-site health care contacts and any other emergency personnel (e.g. EMTs or paramedics) involved in the case was completed.
- Confirm that a sterile-site culture isolate from the hospital lab, if available, has been sent to the MDHHS laboratory for serogroup typing.
- Provide education on signs and symptoms of meningococcal disease for potentially exposed individuals. Symptoms generally develop within 14 days.
- As needed, provide templates of informational letters for parents of school or daycare contacts, or letters for college or workplace settings.
- Update the MDSS record at least daily with the investigation status and details.

### **16.3) Michigan Department of Health and Human Services:**

- Provide consultation and recommendations on case investigation and prophylaxis, as needed, to healthcare providers and the local health departments.
- Review cases of meningococcal disease submitted to the MDSS.
- Verify cases meet appropriate case definition guidelines.
- Maintain and enhance statewide surveillance data.
- Maintain serogroup surveillance data from specimens tested at the MDHHS Lab.
- Assist in multi-county investigations as requested by the local health departments.
- Route out-of-state cases to appropriate jurisdictions.
- Assist in the determination of sporadic vs. outbreak situations.
- Consult with the MDHHS laboratory and request PFGE, when appropriate, for suspected outbreaks.
- Consult on the role of vaccination for control measures in an outbreak.

## **17.) References**

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## **18.) Updates**

- 04/2017: Section 14.2- Advisory Committee on Immunization Practices (ACIP) ACWY (Non-Group B) Meningococcal Vaccine Guidelines updated to include new ACIP vaccination recommendations for HIV-infected individuals; published in the MMWR Nov. 4, 2016; 65(43): 1189-1194.
- 01/2018: Section 14.3- Advisory Committee on Immunization Practices (ACIP) Group B Meningococcal (MenB) Vaccine Guidelines updated to include new ACIP dosage recommendations for Trumenba® vaccination published in the MMWR May 19, 2017 66(19);509–513

Note: The use of trade names in this document is for identification purposes only and does not imply endorsement by the Michigan Department of Health and Human Services. While every attempt has been made to accurately reflect the current recommendations related to meningococcal disease treatment and prevention, this document should not be considered a substitute for understanding and following the most up-to-date guidance materials. This document is not intended to replace clinical decision making.