

INFORMATION PAPER

DHA-IHD
10 May 2023

SUBJECT: Meningococcal Disease and Meningococcal Vaccines

1. Purpose. To describe meningococcal disease and the vaccines to prevent it.
2. Facts.
 - a. Microbiology. *Neisseria meningitidis*, or meningococcus, is an aerobic, gram-negative diplococcus, closely related to *N. gonorrhoea* and to several nonpathogenic *Neisseria* species, such as *N. lactamica*. *N. meningitidis* has both an inner and outer membrane, separated by a cell wall. The outer membrane contains several protein structures that enable the bacteria to interact with the host cells as well as perform other functions. The outer membrane is surrounded by a polysaccharide capsule that protects the organism from phagocytosis and complement-mediated lysis. There are thirteen distinct serogroups, which are based on the characteristics of the polysaccharide capsule. However, only 5 serogroups of *N. Meningitidis* (A, B, C, W, and Y) cause the majority of disease.
 - b. Disease. *N. meningitidis* colonizes mucosal surfaces of the nasopharynx and is transmitted through direct contact with respiratory droplet secretions from infected individuals and asymptomatic carriers. Humans are the only host. Meningococcal disease is a serious health threat, causing meningitis (inflammation of membranes around the brain and spinal cord), or blood infections (meningococemia). Bacterial meningitis can be extremely severe resulting in brain damage, hearing loss, or learning disability. For bacterial meningitis, it is important to know which type of bacteria is causing the meningitis because antibiotics can prevent some types from spreading and infecting other people. Common symptoms in individuals aged 2 years and older, which develop over several hours, or can take 1 to 2 days, include high fever, headache, and stiff neck. Other symptoms include nausea, vomiting, confusion, sleepiness, and discomfort looking into bright lights. In newborns and small infants, the classic symptoms may be difficult to detect. The infant may appear slow, inactive, and/or irritable, experience vomiting, or loss of appetite. As the disease progresses, individuals of any age may develop seizures. Meningococcal disease can be disfiguring or disabling (i.e., limb amputations, hearing loss, brain damage) in up to 20% of those who recover.

- c. **Epidemiology.** Meningococcal disease occurs worldwide in both endemic and epidemic form. Despite the use of effective antibiotics, meningococcal disease still results in death for 10% to 14% of those who become ill. Of note, outbreak-associated cases are associated with a higher case-fatality rate than sporadic cases (21% vs. 11%). Of the many serotypes of meningococcal bacteria, serotype A disease occurs primarily in Africa (in the “meningitis belt”) and Asia; serotype B accounts for more than 50% of meningococcal disease in infants aged 1 year and younger; and serotypes C, Y, and W-135 cause more than 75% of illness in persons aged 11 years and older. Serious (also called invasive) meningococcal disease occurs most often in infants younger than 1 year of age and surges a second time in adolescence. High-risk groups include college freshmen and military trainees living in dormitories (likely due to crowded living conditions), people with immune deficiencies, travelers to areas where the disease is endemic (sub-Saharan Africa), and people who do not have a spleen or whose spleen is not functioning (as in sickle-cell anemia).
- d. **Vaccines.** There are two types of meningococcal vaccines available in the United States:
 - (1) Serogroup ACWY Meningococcal conjugate vaccines:
 - Menveo®: 2 vial presentation: 2 months-55 years; 1 vial presentation: 10 years-55 years.
 - MenQuadfi®: 2 years and older
 - Menactra®**: 9 months-55 years. No longer available to order through the manufacturer.
 - a) Routinely, all healthy 11–12-year-olds should be vaccinated with a quadrivalent (protects against serogroups A, C, W, and Y) meningococcal conjugate vaccine. A booster dose is recommended at age 16 years. For adolescents who receive the first dose at age 13 through 15 years, a booster dose should be administered, preferably at age 16 through 18 years, before the period of increased risk. Adolescents who receive their first dose of quadrivalent meningococcal conjugate vaccine at or after age 16 years do not need a booster dose.
 - b) When quadrivalent meningococcal conjugate vaccine was first recommended for adolescents in 2005, the expectation was that protection would last for 10 years; however,

currently available data suggest it wanes in most adolescents within 5 years. Based on that information, a single dose at the recommended age of 11 or 12 years may not offer protection through the adolescent years at which risk for meningococcal infection is highest (16 through 23 years of age).

- c) For patients who are about to start college and got their first dose of quadrivalent meningococcal conjugate vaccine more than 5 years ago, it is recommended that these patients receive a booster dose of quadrivalent meningococcal conjugate vaccine.
- d) For patients younger than 16 years who require fewer healthcare visits, clinical judgment is recommended when determining when to provide the booster dose. The minimum interval between doses is 8 weeks.
- e) Adolescents who receive their first dose of meningococcal conjugate vaccine at or after age 16 years do not need a booster dose.
- f) Children and adults at high risk (HIV, absent or poorly functioning spleen, have a complement deficiency, are traveling to, or living in, an endemic area, or exposed during an outbreak) should be vaccinated with the age appropriate MenACWY vaccine. Recommended vaccine, doses and intervals vary according to age and target group. Infants 2-23 months of age with asplenia or HIV may receive Menveo without potential interference in the PCV 13 response. MenQuadfi (≥ 2 years) was not studied in children but has no PCV impact in adolescents. Menactra** should be administered after 2 years of age due to potential impact on PCV 13 response.
- g) Menveo and MenQuadfi (≥ 2 years) may be administered to a child at increased risk for meningococcal disease any time before or after DTaP. Menactra** should be given either before or with DTaP due to potential interference in vaccine response.
- h) Adults considered at high risk should receive two-dose primary series 2 months apart, and then get a booster dose every 5 years of a quadrivalent meningococcal conjugate vaccine if:

- i. They have complement component deficiency (e.g., C5-C9, properdin, factor H, factor D, or are taking eculizumab (Soliris®), ravulizumab (Ultomiris®) or other complement inhibitor medication.
 - ii. They have functional or anatomic asplenia.
 - iii. They are a microbiologist who is routinely exposed to *Neisseria meningitidis* (the causal pathogen).
 - iv. They are traveling or residing in countries in which the disease is common.
 - v. They are part of a population identified to be at increased risk because of a serogroup A, C, W or Y meningococcal disease outbreak.
 - vi. They are a first-year college student living in a residence hall.
 - vii. They are a military recruit.
- i) Although off-label, the ACIP recommends that individuals 56 years or older who require meningococcal vaccination because they are at increased risk for meningococcal disease (as listed above), receive either MenQuadfi® or Menveo®.

***Meningococcal polysaccharide vaccine, Menactra® will no longer available to order in the United States after 2022 but may be used until the expiration date. Menomune® has not been available since September 2017. MenHibrix®, another meningococcal conjugate vaccine at one time used for high-risk individuals 2–15 months of age, was discontinued February 2017.*

- (2) Serogroup B meningococcal vaccines (Bexsero® and Trumenba®):
- a) Routine vaccination recommended for people 10 years and older identified as being at increased risk. Increased risk includes:
 - i. Persons identified as at increased risk because of a serogroup B meningococcal disease outbreak.

- ii. Routine occupational exposure to isolates of *Neisseria meningitides*.
 - iii. Persons with persistent complement component deficiencies (e.g., C5-C9, properdin, factor H, factor D, or are taking eculizumab (Soliris®), ravulizumab (Ultomiris®) or other complement inhibitor medication.
 - iv. Persons with anatomic or functional asplenia.
- b) Adolescents and young adults 16 through 23 years of age **may** be vaccinated with MenB vaccines to provide short-term protection against most strains of serogroup B meningococcal disease.
- i. MenB vaccines may be prescribed for healthy first-year college students living in residence halls.
- c) Either MenB vaccine can be used when indicated.
- d) Bexsero® and Trumenba® are not interchangeable; the same vaccine product must be used for all doses in a series.
- e) On the basis of available data and expert opinion Bexsero® and Trumenba® may be administered concomitantly with other vaccines indicated for this age, but at a different anatomic site, if feasible.
- f) Bexsero® (MenB-4C) is licensed as a 2-dose series, with doses administered at least 1 month apart.
- g) Trumenba (MenB-FHbp) is licensed as both a 3-dose (0.5 mL at 0, 1-2, and 6 months) and 2-dose (0.5 mL at 0 and 6 months) series.
- i. For persons at increased risk for meningococcal disease and for use during serogroup B meningococcal disease outbreaks, 3 doses of MenB-FHbp should be administered at 0, 1–2, and 6 months to provide earlier protection and maximize short-term immunogenicity. However, if the second dose of MenB-FHbp is administered at an interval of ≥6 months, a third dose does not need to be administered.

- ii. For healthy adolescents who are not at increased risk for meningococcal disease, 2 doses of MenB-FHbp should be administered at 0 and 6 months. If the second dose of MenB-FHbp is administered earlier than 6 months after the first dose, a third dose should be administered at least 4 months after the second dose.
- h) MenB vaccines are not recommended for persons who travel to or reside in countries where meningococcal disease is epidemic or hyperendemic because the risk for meningococcal disease in these countries generally is not caused by serogroup B.
- i) Before administering MenB vaccines, providers should consult the package insert for precautions, warnings, and contraindications.

3. References.

- a. Centers for Disease Control and Prevention. Use of Serogroup B Meningococcal Vaccines in Persons Aged ≥ 10 Years at Increased Risk for Serogroup B Meningococcal Disease: Recommendations of the Advisory Committee on Immunization Practices. MMWR 2015; 64(22): 608-612. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6422a3.htm>
- b. Centers for Disease Control and Prevention. Updated Recommendations for Use of MenB-FHbp Serogroup B Meningococcal Vaccine — Advisory Committee on Immunization Practices. MMWR 2017; 66(19): 509-513. <https://www.cdc.gov/mmwr/volumes/66/wr/mm6619a6.htm>
- c. Centers for Disease Control and Prevention. Meningococcal: Who Needs to Be Vaccinated? 2017. Retrieved from <https://www.cdc.gov/vaccines/vpd/mening/hcp/who-vaccinate-hcp.html>.
- d. Multiple resources (e.g., package inserts, Vaccine Information Statements) assembled by DHA-IHD: www.health.mil/meningococcal.

North Atlantic Region Vaccine Safety Hub
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