INFORMATION PAPER

DHA-IHD
8 October 2020

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. gonorrhea 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 (meningococcemia). Treatment varies, dependent on the cause and severity of illness. Viral meningitis is generally less severe and resolves without specific treatment. 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 (Mentactra®, Menveo®, and MenQuadfi®):

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 (Menactra [9mo-55yrs], Menveo [2mo-55yrs], or MenQuadfi [≥2 yrs]). 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 students 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 they receive a booster dose of quadrivalent meningococcal conjugate vaccine.

d. For children 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. For children 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 Menactra after 2 years of age to avoid interference with the infant series of pneumococcal conjugate vaccine (PCV13). Impact of MenQuadfi was not studied in children, but has no PCV13 impact in adolescents. Infants 2 through 23 months of age with asplenia or HIV may receive Menveo without PCV13 impact.

g. Due to potential interference in the response to the Menactra vaccine if given within 30 days after receipt of DTaP, the CDC recommends that if Menactra® is to be administered to a child at increased risk for meningococcal disease, Menactra be given either before or with DTaP. Alternatively, Menveo or MenQuadfi (if ≥ 2yrs) may be administered.

h. Adults considered at high risk should receive a 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 Soliris®).

ii. They have functional or anatomic asplenia.

iii. They are living with HIV

iv. They are a microbiologist who is routinely exposed to *Neisseria meningitidis* (the causal pathogen).

v. They are traveling or residing in countries in which the disease is common.

vi. They are part of a population identified to be at increased risk because of a serogroup A, C, W or Y meningococcal disease outbreak.

vii. They are a first-year college student living in a residence hall.

viii. They are a military recruit.

i. Meningococcal polysaccharide vaccine (Menomune®) became unavailable in the United States after September 2017. Between October 2018 and June 2020, although off-label, the ACIP recommended that individuals 56 years or older at increased risk for meningococcal disease (as listed above), receive either Menactra or Menveo. However, MenQuadfi, licensed in 2020 for use in individuals 2 yrs of age and older, is now the preferred meningococcal vaccine for individuals 56 years or older.

(2) Serogroup B meningococcal vaccines (Bexsero® and Trumenba®):

a. Routine vaccination recommended for people 10 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 Soliris®).

iv. Persons with anatomic or functional asplenia.

b. Adolescents and young adults 16 through 23 years of age **may** be vaccinated with MenB vaccines on the basis of shared clinical decision-making 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. Serogroup B meningococcal vaccines (Bexsero® and Trumenba®) and Meningococcal conjugate as well as other vaccines may be administered during the same visit, but at a different injection 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.

h. 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.

i. During an outbreak, a single MenB booster dose is recommended if it had been ≥1 year since primary series completion.

j. For persons who remain at increased risk for meningococcal disease, a booster may be administered at 1 yr after completion of primary vaccination and every 2–3 yrs thereafter.

k. 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.

k. 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.

l. Before administering MenB vaccines, providers should consult the package insert for precautions, warnings, and contraindications.

3. References.

a. Centers for Disease Control and Prevention. Meningococcal Vaccination: Recommendations of the Advisory Committee on Immunization Practices, United States, 2020: Recommendations of the Advisory Committee on Immunization Practices. MMWR 2020; 69(9):1-41 https://www.cdc.gov/mmwr/volumes/69/rr/rr6909a1.htm

b. 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

c. Centers for Disease Control and Prevention. Updated Recommendations for Use of MenB-FHbp Serogroup B Meningococcal Vaccine — Advisory Committee on Immunization Practices, 2016. MMWR 2017; 66(19): 509-513. https://www.cdc.gov/mmwr/volumes/66/wr/mm6619a6.htm

d. Centers for Disease Control and Prevention. Recommendations for Use of Meningococcal Conjugate Vaccines in HIV-Infected Persons — Advisory Committee on Immunization Practices, 2016. MMWR, 2016;65(43): 1189–1194. https://www.cdc.gov/mmwr/volumes/65/wr/mm6543a3.htm

e. 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.

f. Multiple resources (e.g., package inserts, Vaccine Information Statements) assembled by the Immunization Healthcare Division: www.health.mil/meningococcal.

g. Centers for Disease Control and Prevention. Summary of GRADE for MenACWY-TT (MenQuadfi). James Cope, MPH, PhD, May 18, 2020

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