INFORMATION PAPER

DHA-IHD
28 October 2020

SUBJECT: Pneumococcal Disease and Pneumococcal Vaccines

1. Purpose. To describe pneumococcal disease and the vaccines that prevent it.

2. Facts.

    a. Microbiology. Pneumococcal disease is an infection caused by the bacteria *Streptococcus pneumoniae*, also known as pneumococcus or pneumococci. The bacteria are lancet-shaped, gram-positive, facultative anaerobic organisms. Some pneumococci are encapsulated and are pathogenic (disease-causing) for humans. More than 90 serotypes have been identified: most have been shown to cause serious disease, but only a few produce the majority of infections.

    b. Disease. The 10 most common serotypes are estimated to account for about 62% of invasive disease worldwide. The ranking and serotype prevalence differ by patient age group and geographic area. The most common presentation of a pneumococcal infection among adults is pneumonia. Symptoms generally include abrupt onset of fever and chills or rigor. Other common symptoms include pleuritic chest pain, productive cough, shortness of breath, and rapid breathing. Pneumococcal infections may also lead to bacteremia, an infection of the blood, and meningitis, an infection and swelling of the brain. In children 2 years of age and younger, bacteremia without a known site of infection is the most common invasive clinical presentation of pneumococcal infection. Pneumococcus is also a common cause of otitis media (middle ear infections), and is the leading cause of meningitis in children under 5 years of age.

    c. Epidemiology. Pneumococci are common inhabitants of the respiratory tract and may be isolated from the nasopharynx of 5% to 90% of healthy persons. Rates of asymptomatic carriage vary with age, environment, and the presence of upper respiratory infections. Among school-aged children, 20%–60% may be colonized. Only 5%–10% of adults without children are colonized although, on military installations, as many as 50%–60% of service personnel may be colonized. *Streptococcus pneumoniae* bacteria are spread through direct person-to-person contact with respiratory droplets released from secretions in the nose, mouth, and throat. Persons with immunocompromising conditions (from disease or drugs), functional or anatomic asplenia (including sickle cell disease), CSF leaks, or cochlear implants are at higher risk for serious infections. On average,

pneumococcal infections cause over 40,000 cases and 4,500 deaths from invasive disease (bacteremia and meningitis) annually in the United States.

d. Vaccine(s).

(1) Prevnar 13® (PCV13) conjugate vaccine, manufactured by Wyeth, is a sterile suspension of 13 *S. pneumoniae* serotypes individually conjugated to diphtheria CRM197 protein. Prevnar 13® was licensed in 2010 and replaced Prevnar 7®. Aluminum phosphate is used as an adjuvant in the vaccine.

(2) Pneumovax 23® (PPSV23) polysaccharide vaccine, manufactured by Merck, consists of a mixture of purified capsular polysaccharides from 23 *S. pneumoniae* serotypes. Pneumovax 23® was licensed in 1983 and replaced a 14 serotype version licensed in 1977. Phenol has been added to the vaccine as a preservative.

e. Cautions. Individuals with a history of a severe allergic reaction (e.g. anaphylaxis) to a vaccine or any of its components should not receive that vaccine. In a person who has a moderate or severe acute illness with or without fever, clinicians may administer pneumococcal vaccines if the provider and parent or patient deems the benefits of vaccination outweigh the risks. Administer pneumococcal vaccination at least 2 weeks before starting immune-suppressive therapy or elective splenectomy, if possible. In persons with anatomic or functional asplenia and/or HIV infection, quadrivalent meningococcal conjugate vaccine (MenACWY-D, Menactra®) and pneumococcal conjugate vaccine (PCV13, Prevnar 13®) should not be administered simultaneously. This is based on immunogenicity studies that showed reduced antibody concentrations for three serotypes of pneumococcus (subtypes 4, 6B, and 18C) when PCV7 was administered simultaneously with MenACWY-D. For persons with anatomic or functional asplenia and/or HIV, PCV13 should be administered first and MenACWY-D 4 weeks later.

f. Immunization.

(1) Choice of pneumococcal vaccine:

a. PCV13 (Prevnar 13®) should be administered as a routine four dose series to all children 2 through 59 months of age. The primary series beginning in infancy consists of three doses given intramuscularly at 2, 4, and 6 months of age. The first dose can be administered as early as 6 weeks of age. A fourth (booster) dose is recommended at 12–15

months of age. PCV13 should be administered at the same time as other routine childhood immunizations, using a separate syringe and injection site. For children vaccinated at younger than 12 months of age, the minimum interval between doses is 4 weeks. Doses given at 12 months of age and older should be separated by at least 8 weeks. A PCV schedule begun with PCV7 should be completed with PCV13. Unvaccinated children 7 months of age and older do not require the full series: see the current CDC catch-up immunization schedule for recommendations.

b. PPSV 23 (Pneumovax 23®) is administered as a single dose, given intramuscularly or subcutaneously. The vaccine is indicated for all adults 65 years of age and older, and persons 2 to 64 years of age that are at high risk for invasive pneumococcal disease. A one-time booster dose of PPSV23 is recommended 5 years after the first dose for asplenic and immunocompromised persons.

(2) PCV13 was previously recommended for all adults 65 years and older, but recent data indicates PCV13 use in children has led to sharp declines in pneumococcal disease among adults. In November 2019, the Advisory Committee on Immunization Practices (ACIP) changed the recommendation: PCV13 vaccination is no longer routinely recommended for all adults aged ≥65 years. Instead, shared clinical decision-making for PCV13 use is recommended for persons aged ≥65 years who do not have an immunocompromising condition, CSF leak, or cochlear implant and who have not previously received PCV13. PCV13 and PPSV23 should not be given at the same time. The recommended interval between PCV13 and PPSV23 for these persons is one year.

(3) Adults 19 years of age and older with immunocompromising conditions (from disease or drugs), functional or anatomic asplenia (including sickle cell disease), CSF leaks, or cochlear implants are recommended to receive a dose of PCV13 followed by a dose of PPSV23:

a. Adults with no or unknown pneumococcal vaccination history (PCV13 or PPSV23) should receive a dose of PCV13, followed by a dose of PPSV23 ≥8 weeks later. Additional doses of PPSV23 should be administered according to the current CDC recommendations for adults at high risk.

b. Adults who received ≥1 dose of PPSV23 before age 65 should be given a PCV13 dose at least one year after the last PPSV23 dose was received. For those who require additional doses of PPSV23, the first such dose should be given no sooner than 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

c. Persons who received PPSV23 before age 65 years for any indication should receive another dose of the vaccine at age 65 years or later, and at least 5 years after the previous PPSV23 dose. Per ACIP recommendations, the maximum number of doses that a person should receive in a lifetime is three.

g. Adverse Events. The most common adverse reactions after vaccination are fever and injection site complaints such as soreness, warmth, redness, swelling, or induration. Serious allergic reactions are very rare.

h. DoD Policy. Administer both pneumococcal vaccines to DoD beneficiaries as routinely indicated based on current ACIP recommendations, and to those who are in a high-risk category per ACIP recommendations or local Preventive Medicine guidance for disease outbreak prevention. Administer a second dose of PPSV23 to asplenic or severely immunocompromised persons five years after the initial dose.

3. References.

a. Bennett, N., Pilishvili, T., Whitney, C., Moore, M., Gierke, R., & Harris, A. (2013). Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine among Children Aged 6–18 Years with Immunocompromising Conditions: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR, 62(25), 521-524.

b. Bennett, N., Whitney, C., Moore, M., Pilishvili, T., & Dooling, K. (2012). Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine for Adults with Immunocompromising Conditions: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR, 61(40), 816-819.

c. Centers for Disease Control and Prevention. (2020). Active Bacterial Core surveillance: Surveillance Reports. https://www.cdc.gov/abcs/reports-findings/surv-reports.html

d. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington D.C. Public Health Foundation, 2015.

e. Multiple resources (e.g., product insert, Vaccine Information Statements) assembled by the Immunization Healthcare Division: www.health.mil/pneumococcal

f. Kobayashi, M., Bennett, N., Gierke, R., Almendares, O., Moore, M., Whitney, C., & Pilishvili, T. (2015) Intervals between PCV13 and PPSV23 Vaccines: Recommendations of the Advisory Committee on Immunization Practice (ACIP). MMWR, 64(34), 944-947.

g. Matanock, A., Lee, G., Gierke, R., Kobayashi, M., Leidner, A., & Pilishvili, T. (2019). Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine among Adults Aged ≥65 Years: Updated Recommendations of the Advisory Committee on Immunization Practices. MMWR, 68(46), 1069–1075.

h. Nuorti, J., Whitney, C. (2010). Prevention of Pneumococcal Disease among Infants and Children - Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR, 59(RR11), 1-18.

South Atlantic Region Vaccine Safety Hub
Approved: Deputy Chief, Immunization Healthcare Division
877-438-8222 (DSN 761-4245), option 1