Meningococcal meningitis is a rare but often fatal disease. Throughout adolescence, the incidence of meningococcal meningitis increases, reaching a peak among individuals between the ages of 16 and 21 years. Vaccines are available to combat this deadly disease. Recently, the Centers for Disease Control and Prevention’s Advisory Committee on Immunization Practices updated its recommendations on meningitis vaccination to improve outcomes and to prevent this disease in adolescents and other vulnerable populations, such as adults traveling internationally to epidemic areas. Improved meningitis vaccines and revised vaccination recommendations will help to create a healthier world.

Meningococcal meningitis, a form of meningococcal disease, is a rare but serious bacterial infection caused by Neisseria meningitidis. In the United States, an estimated 1000 to 2600 individuals get meningococcal disease each year.1 Symptoms typically develop in patients within 3 to 7 days after exposure, and infection can potentially take the life of an individual within hours of the onset of symptoms.2 Even if infected patients are treated with antibiotics, 10% to 15% of them will die of the disease, and another 15% will have long-term disabilities.3

Anyone can get meningococcal disease. However, the disease is most common among certain groups of people, including infants younger than 1 year and individuals with certain medical conditions, such as sickle cell disease and lack of a functional spleen.2 Individuals between the ages of 16 and 21 years have the highest rates of meningococcal disease, including meningitis and sepsis, often resulting in permanent disabilities or death.2,4

Early in the course of meningitis, symptoms of the disease can be almost impossible to differentiate from similar symptoms of more common viral illnesses. Unlike more common illnesses, however, meningococcal disease can cause disability or death in less than a day.2 Death from meningococcal disease occurs most rapidly in children younger than 4 years. Many survivors of meningococcal meningitis are left with serious medical problems that require amputation of limbs, fingers, or toes. In addition, adverse effects can occur in multiple body systems, including severe scarring of skin, hearing loss, blindness, kidney damage, brain damage, and psychological problems.2,3

Vaccination

Meningococcal meningitis vaccines are available for a wide age range of patient populations. In October 2010, the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control and Prevention (CDC) approved revisions to the recommendations for meningococcal immunization.4,6 These changes, published in 2011, are described in the “Children and Adolescents” and “Adults” sections of the present article and highlighted in Figure 1.

Two quadrivalent meningococcal conjugate vaccines (MCV4) are licensed in the United States for prevention of meningococcal disease caused by serogroups A, C, Y, and W-135 in patients aged 2 to 55 years.4,7 One vaccine is MenACWY-CRM (Menevo; Novartis Pharmaceuticals, East Hanover, New Jersey), and the other vaccine is MenACWY-D (Menactra; Sanofi Pasteur Inc, Swiftwater, Pennsylvania).4,7 The ACIP recommends using either MCV4 as the primary or booster vaccine, noting the superiority of these vaccines over the quadrivalent meningococcal polysaccharide vaccine (MPSV4 [Menomune; Sanofi Pasteur Inc]), which has been marketed since the 1970s.6 All physicians and other healthcare personnel should be vaccinated against meningitis regardless of the vaccine brand used as the primary or booster dose.4

Children and Adolescents

According to the ACIP revised recommendations, all individuals aged 11 or 12 years should be routinely vaccinated with MCV4, with a booster dose given at age 16.4,6 When MCV4 was first recommended for adolescents in 2005, the protection provided by the vaccine was believed to last 10 years. However, post-marketing data have suggested that the

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Routine vaccination of adolescents, preferably at age 11 or 12 years, with a booster dose at age 16 years

- A 2-dose primary series administered 2 months apart for persons aged 2 through 55 years with persistent complement component deficiency (eg, C5-C9, properdin, factor H, factor D) or functional or anatomic asplenia
- A 2-dose primary series administered 2 months apart for adolescents with human immunodeficiency virus infection

Figure 1. Revisions to recommendations for meningococcal meningitis vaccination approved in October 2010 by the Centers for Disease Control and Prevention’s Advisory Committee on Immunization Practices.4–6

- The vaccine’s protective effects wane within 5 years.4,6 For adolescents who receive their first dose of MCV4 at ages 13 through 15 years, a 1-time booster dose should be administered, preferably at age 16 through 18 years (before the peak in increased risk). Adolescents who receive their first dose of MCV4 at or after age 16 years do not need a booster dose.4,6 For new college enrollees who received their primary dose of MCV4 more than 5 ago, the ACIP suggests that the booster vaccine be administered before beginning college.6,8

The minimal interval between MCV4 doses is 8 weeks, and the booster can be administered in a child who is younger than 16 years if the healthcare provider determines it is indicated.3 If the patient received MPSV4 as the primary vaccine, MCV4 can be used as the booster without having to restart the series. As noted in the ACIP revised recommendations, patients aged 11 through 18 years who have human immunodeficiency virus infection should be routinely vaccinated with a 2-dose primary MCV4 series administered 2 months apart.4,6 Adolescents with human immunodeficiency virus infection who received the primary series before age 16 years should receive the routine booster dose at age 16 years.

The quadrivalent meningococcal conjugate vaccine is recommended for certain children aged 2 through 10 years who are at high risk of meningococcal disease. This recommendation includes children who travel to, and US citizens who reside in, countries where meningococcal meningitis is hyperendemic or epidemic; individuals with complement component deficiency; and individuals with functional or anatomic asplenia (eg, sickle cell disease).4,6 Children aged 2 through 6 years who are at increased risk of meningococcal disease should be revaccinated with MCV4 3 years after receiving their first MCV4 injection—and then at 5-year intervals if they remain at risk.4,6

The ACIP evaluated results of a multicenter randomized controlled trial comparing the safety and immunogenicity of MenACWY-CRM with that of MenACWY-D in children aged 2 to 10 years. The results indicated that after a single MenACWY-CRM dose, seroresponses to group C, Y, and W-135 in children aged 2 to 5 years and 6 to 10 years were noninferior to responses after a single MenACWY-D dose.4,6 Thus, either MCV4 vaccine can be used for the primary or booster dose.

**Adults**

According to the ACIP revised recommendations, a 2-dose primary series of MCV4 (ie, either MenACWY-CRM or MenACWY-D) should be administered 2 months apart for individuals aged 2 through 55 years who have certain medical risk factors (eg, complement component deficiency, functional or anatomic asplenia).4,6 A booster dose is recommended for adults every 5 years if the adult remains at increased risk.

Adults should receive a single dose of either MPSV4 (if they are aged 56 years or older) or MCV4 (if they are aged 19 through 55 years) if any of the situations described in Figure 2 apply to them.5,6

**Potential Adverse Effects**

The quadrivalent meningococcal conjugate vaccine has the potential to cause serious health problems, such as severe allergic reactions—though the risk of such problems, or of death, is extremely small.9 Some of the mild adverse effects associated with MCV4 include redness or pain at the injection site and fever lasting as long as 48 hours.

In June 2010, the ACIP recommended that Guillain-Barré syndrome not be listed as a precaution or contraindication for MCV4. According to the ACIP, safety surveillance demonstrates that any risk of subsequent Guillain-Barré syndrome after receiving MCV4 is outweighed by the benefits of the vaccine.10

**Conclusion**

Although meningococcal disease is rare, it can be fatal. Thus, it is the goal of the ACIP to have all adolescents vaccinated with MCV4 beginning at age 11 years, with a booster given at age 16 years. The booster would prevent the waning of the primary vaccine and protect adolescents during the period of highest risk for meningococcal disease. The ACIP also recommends MCV4 immunization for adults who have not been vaccinated and for children at high risk of exposure to meningococcal disease.

The ACIP has harmonized and simplified the meningococcal vaccine schedule to encourage providers to immunize adults, adolescents, and children and to increase parental awareness of vaccination against this preventable disease. The ACIP has been joined by other organizations—including the American Osteopathic Association, the American Medical Association, the American College of Osteopathic Pediatricians, and the American Academy of Pediatrics—in educating and alerting
providers about the new ACIP recommendations.

References


7. Centers for Disease Control and Prevention. Updated recommendation from the Advisory Committee on Immunization Practices regarding pneumococcal vaccination for adults have not changed appreciatively in several years. However, it is possible that ongoing research may lead to changes in these recommendations within the next few years. Since the licensure of the 7-valent pneumococcal conjugate vaccine for children in 2000, impressive decreases in pneumonia-related diseases caused by strains in the vaccine have been noted among all age groups receiving vaccination. Coupled with continued concerns about the efficacy of the 23-valent pneumococcal polysaccharide vaccine for adults, particularly in regard to nonbacteremic pneumonia, questions are raised about the potential efficacy and viability of conjugate vaccines for adults. In the present article, I investigate the potential impacts of vaccination on rates of pneumococcal infections, to analyzing the efficacy of pneumococcal vaccines in terms of disease processes, most commonly pneumonia.

