What are the indications for meningococcal vaccination?

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EVIDENCE-BASED ANSWER

Routine vaccination with the meningococcal conjugate vaccine MCV4 (Menactra) is indicated for all US adolescents entering high school and for college freshmen living in dormitories (strength of recommendation [SOR]: **B,** based on observational studies). For convenience, MCV4 can be given at the 11- to 12-year-old visit.

High-risk individuals (ages 2 and older) who should receive meningococcal vaccine (MCV4 or the unconjugated polysaccharide vaccine [MPSV4]) include those with terminal complement deficiencies, asplenia, or HIV, as well as military recruits, laboratory personnel exposed to aerosolized meningococci, and travelers to areas hyperendemic or epidemic for *Neisseria meningitides* (SOR: **C,** based on consensus guidelines). Routine vaccination of infants and toddlers with conjugate vaccine may be more cost-effective than targeting adolescents, but conjugate meningococcal vaccine for this age group is not yet available in the US (SOR: **B,** based on cohort studies). ❑

CLINICAL COMMENTARY

The vaccine is available and efficacious – use it well

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As a junior military medical officer, my first assignment was in San Diego, California near the former Naval Training Center (NTC). The NTC was the site of one of the last major outbreaks of meningococcal disease in a military barracks setting. I recall with alacrity the rapidity with which this disease overcomes its host, and the overwhelming morbidity (and mortality) the disease leaves behind if treatment is delayed. This is truly a "not-to-be-missed" diagnosis.

The historical parallels between smallpox and meningococcal disease are striking. Each is spread primarily by respiratory means, particularly in close quarters. While meningococcal disease is amenable to antibiotic treatment when recognized early (contrary to smallpox), the principles of high-risk "herd" immunization hold true for both conditions. By focusing on high-risk groups and adhering to ACIP recommendations, control of meningococcal disease is within the grasp of modern medical science. The vaccine is available. The vaccine is efficacious. Use it well. ❑

EVIDENCE SUMMARY

FAST TRACK

With a focus on immunizing high-risk groups, control of meningococcal disease is within our grasp

Two meningococcal vaccines are currently available in the US: tetravalent polysaccharide vaccine (MPSV4) and tetravalent polysaccharide-protein conjugate vaccine (MCV4). Both protect against serogroups A, C, Y, and W-135, but not against serogroup B, which is the most prevalent. A vaccine for serogroup B is under development.

MPSV4 is licensed for ages 2 years and up, but its poor immunogenicity in infants, lack of memory and booster response, and relatively short duration of protection have restricted its use. MCV4 is licensed for 11- to 55-year-olds and is the preferred vaccine in this age group, since it provides longer duration of immunity and reduces nasopharyngeal carriage. (1)

FAST TRACK

Freshmen living in dormitories had an elevated risk of meningococcal disease compared with other undergraduates

Infants and freshman are especially vulnerable

Using active community surveillance from 1991 to 2002, Centers for Disease Control and Prevention (CDC) data (2) found annual rates of meningococcal disease in the US of 0.5 to 1.1 per 100,000. The highest rates were found in children under age 2. Infants younger than 12 months of age were especially vulnerable (rate 9/100,000), with more than 50% of cases caused by serogroup B.

A 1998-1999 prospective surveillance study[3] including 50 state health departments and 231 college health centers identified 96 cases of meningococcal disease in college students (incidence 0.7/100,000). Freshmen living in dormitories had an elevated risk of meningococcal disease compared with other undergraduates or nonstudents of the same age (incidence 5.1/100,000; adjusted relative risk=3.6 [95% confidence interval [CI], 1.6–8.5). Sixty-eight percent had illness due to a vaccine-preventable serogroup.

Using CDC incidence data, a cost-effectiveness model (4) compared hypothetical vaccination strategies targeting US infants (3 doses), toddlers (1 dose), or 11-year-olds (1 dose). Routine MCV4 vaccination of all 11-year-olds would prevent 270 cases and 36 deaths in this cohort over their next 22 years. For a toddler cohort, vaccination would prevent 385 cases and 33 deaths; for infants, 447 cases and 36 deaths. Conjugate meningococcal vaccines for serogroups A and C have been tested and used in children in other countries, and appear safe and effective, but are not yet available in the US. An application has been submitted for FDA approval of MCV4 for 2- to 10-year-olds.

Herd immunity may expand benefit of vaccination

A British study compared attack rates for meningococcal C disease in children from infancy to age 18 before and 1 to 2 years after the institution of a nationwide meningococcal serogroup C conjugate vaccination. Vaccine coverage ranged from 66% (adolescents) to 87% (schoolchildren), and vaccine efficacy was 94% to 96%. Incidence of meningococcal C disease in the unvaccinated children also decreased by 52% to 67% (from 4.08/100,000 to 1.36/100,000). (5)

FAST TRACK

Vaccinating adolescents may be particularly helpful for building herd immunity

Vaccinating adolescents may be particularly helpful for building herd immunity. A Norwegian study of nasopharyngeal meningococcal carriage among 943 unimmunized individuals ages 2 months

Table

Who should get vaccinated – and when TARGET POPULATION	VACCINE TYPE
Children 2–10 years at increased risk*	MPSV4†
Adolescents 11–12 years	MCV4
Adolescents at high school entry or 15 years of age without prior vaccination	MCV4
College freshmen planning to reside in dormitories	MCV4‡
Patients ages 11–55 at increased risk*	MCV4‡
Patients older than 55 years at increased risk*	MPSV4
Microbiologist, lab personnel exposed to N meningitides	MCV4‡
Military recruits	MCV4‡
*"Increased risk" is defined by terminal complement deficiency, anatomic or functional asplenia, travel to endemic areas, HIV infection (optional).	
†May be repeated every 3 to 5 years if increased risk continues.	
‡MPSV4 is an acceptable alternative.	
MPSV4, meningococcal polysaccharide vaccine; MCV4, meningococcal polysaccharide diphtheria toxoid conjugate vaccine.	
Adapted from Harrison, Clinical Microbiology Reviews 2006; (1) Kimmel, Am Fam Physician 2005. (9)	

to 95 years found a carriage rate of 28% among 15- to 24-year-olds, compared with 9.6% overall. (6)

High hospitalization rates in US military recruits during 1964 to 1970 (25.2/100,000) led to the development of the meningococcal polysaccharide vaccine. Since 1971, all new military recruits have received polysaccharide meningococcal vaccine, and for the period 1990 to 1998 the hospitalization rate for meningococcal disease among active duty service members had decreased by 98% (to 0.51/100,000). (7)

Recommendations from others

The Advisory Committee on Immunization Practices, (2) American Academy of Pediatrics, (8) American Academy of Family Physicians, (9) and American College Association[10] recommendations are summarized in the TABLE. Recommendations for vaccination during meningococcal disease outbreaks can be found at www.cdc.gov. (2)

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