Meningococcal Vaccine: Important Item to Discuss at the Pre-College Physical Exam

September 01, 2004

One fact of life for pediatricians is that our patients grow up. One of our last contacts with our young adult patients who continue on to college may be their pre-college physical examination or their request for a college pre-matriculation immunization form. A pre-college visit provides a good opportunity to review the young adult's immunization status to be certain that he or she is up-to-date. That visit is also a good time to verify that the student has received a booster dose of tetanus toxoid within the past 10 years, a complete series of hepatitis B vaccine, and any other vaccine (such as varicella) that may be indicated.

A newer issue to be discussed with such students and their parents is the meningococcal polysaccharide vaccine.

The potentially devastating effects of meningococcal disease in young adults are all too familiar. Invasive infection can result in meningococcemia, meningitis, or both. Early clinical signs of meningococcemia can include fever, chills, prostration, and rash. The rash is often initially macular or maculopapular but may later become petechial or purpuric (Figure). The onset is often abrupt, and the illness may progress rapidly over several hours to shock, disseminated intravascular coagulation, coma, and death. Invasive meningococcal infection is rare but potentially lethal, with high rates of morbidity and mortality. Despite prompt diagnosis and treatment, the case fatality rate of invasive meningococcal disease remains unchanged at 10% for all groups, and 10% to 20% among adolescents and young adults. Among survivors, 3% to 15% suffer permanent sequelae, such as scars, amputation, hearing loss, and renal problems.

Recent studies have identified a 6- to 7-fold increased risk of invasive meningococcal disease among freshman dormitory residents compared with all college students. This elevated incidence has been attributed to risk factors associated with meningococcal transmission and invasion, such as crowding, active or passive smoking, and exposure to oral secretions and strains of Neisseria meningitidis to which there was no previous exposure during early childhood. The risk may be increased by features of college life, such as dormitories crowded with students of diverse geographic backgrounds, frequent respiratory infections, and patronage of bars or parties with students jammed into smoke-filled rooms.

WHAT THE EXPERTS RECOMMEND

Because of this modestly increased risk of potentially severe illness, 2 national advisory committees (the Committee on Infectious Diseases of the American Academy of Pediatrics [the "Redbook Committee"] and the Advisory Committee on Immunization Practices of the CDC), as well as the American College Health Association, have recommended that entering college students and their parents be informed about meningococcal disease and the benefits of vaccination. Vaccination should be provided for, or made available to, freshmen who wish to reduce their risk of disease. Other non-freshmen undergraduate students who wish to reduce their risk of meningococcal disease may also choose to be vaccinated.

In approximately 25 states, entering students are required either to receive the meningococcal vaccine or to sign a waiver indicating that they have been informed about meningococcal disease and vaccine, and that they have declined to be vaccinated. Providing educational materials about the vaccine to entering college freshmen before their arrival on campus has been associated with substantial increases in the number of students receiving the vaccine.
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HOW SAFE AND EFFECTIVE IS THE CURRENT VACCINE?
The currently available polysaccharide meningococcal vaccine is quadrivalent and protects against disease caused by meningococcal serogroups A, C, Y, and W-135. The distribution of meningococcal serogroups has changed in the past 10 years, such that 70% to 80% of cases among college students are now caused by 1 of these 4 serogroups and are potentially preventable with vaccination. Compared with serogroup B, case fatality rates are higher among patients infected with vaccine-preventable serogroups, and permanent sequelae are more frequent as well. No vaccine currently available in the United States provides protection against serogroup B disease, although efforts are under way to develop such a vaccine.

Adverse reactions to the polysaccharide vaccine are unusual and generally mild. The most common problems are localized pain and erythema that typically last only 24 to 48 hours. For most young adults, 1 dose of vaccine should be sufficient. Antibody concentrations following vaccination drop after 2 to 3 years, however, so if another indication for immunization exists, reimmunization could be considered 3 to 5 years after the initial dose.

The cost of a single dose of vaccine and its administration varies from $55 to $90. Many health insurance companies pay for the meningococcal vaccine for college students, but concerned students and their parents should check with their own insurance carriers about the benefits of their particular policies.

PROS AND CONS OF PRE-EXPOSURE IMMUNIZATION
From a public health perspective, the question of whether to recommend meningococcal vaccine for college students can be debated. A cost benefit to society cannot be demonstrated because the disease is rare, protective antibodies last only 3 to 5 years, and the vaccine fails to provide coverage for serogroup B (which accounts for up to 30% of cases of disease). The cost of vaccinating college students is therefore greater than the societal cost of the disease. As a result, the national advisory committees have not made stronger recommendations so as to avoid committing limited public health resources to a meningococcal vaccination program.

However, the cost per life-year saved is similar to that for some other procedures routinely performed in adolescents and young adults, such as annual Pap smears in young women. Furthermore, the cost per case averted is substantially less than the cost of preventing vaccine-associated paralytic polio by switching from oral poliovirus vaccine to inactivated poliovirus vaccine in 1996.

It is hoped that costs to society will be lower when improved meningococcal vaccines become available. Meningococcal conjugate vaccines (MCV) have been developed by attaching the meningococcal polysaccharides to a carrier protein, as is done for the polysaccharide conjugate vaccines in current use against Haemophilus influenzae Type b and Streptococcus pneumoniae infection. Conjugate vaccines typically induce boostable memory responses and longer-lasting immune responses than polysaccharide vaccines. Some MCVs have already been licensed and used successfully in Canada and the United Kingdom. It is anticipated that the first MCV will soon be licensed in the United States; the national advisory committees are already examining strategies for using these new conjugate vaccines when they become available. Such vaccines may eventually be included as part of the routine schedule for immunizing infants.

A blanket recommendation to vaccinate all adolescents would be extremely expensive-and also logistically difficult. A more practical approach might be to recommend MCV for early adolescents at their yearly routine examination at 11 to 12 years. With this strategy, another birth cohort of 11- to 12-year-olds would be vaccinated each year. Vaccination could also be recommended for college freshmen living in dormitories and for certain other higher-risk groups. The vaccine could also be offered more permissively to adolescents of other ages who wished to lower their risk of invasive meningococcal disease.

The existing permissive recommendation to offer the meningococcal polysaccharide vaccination to college freshmen who live in dormitories has likely created confusion among some young adults, their parents, and even their physicians. This type of recommendation could possibly contribute to widening health disparities between the uninsured/under-insured and the insured. If pre-licensure data about MCVs warrant a stronger recommendation to use these vaccines for incoming college freshmen in dormitories, this may help make these groups eligible for public health assistance for the vaccine and may motivate third-party carriers to cover vaccination.

References:
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