State of the Globe: Effect of Pneumococcal Conjugate Vaccines on Nonvaccine-type Invasive Pneumococcal Disease

Pneumococcal diseases, ranging from serious diseases such as meningitis, septicemia, and pneumonia to milder but commoner infections such as sinusitis and otitis media, are a common cause of morbidity and mortality worldwide.[1] The rates of disease and death are higher in developing countries than in the developed countries, with the majority of deaths occurring in Sub-Saharan Africa and Asia. However, the extent of pneumococcal disease extends to developed world as well with this infection killing thousands of adults, including 18,000 adults 65 years or older in the United States every year.[2] Thousands more adults end up in the hospital because of pneumococcal disease. Pneumococcal disease is most common at the extremes of age, that is, in young children and among the elderly.

As per the World Health Organization (WHO), of over 90 serotypes, only a small minority cause most diseases. Currently available pneumococcal conjugate vaccines (PCVs) target either 10 or 13 of the most prevalent serotypes.[1] Further, as per the recommendations of the WHO, PCV needs to be a part of childhood immunization programs worldwide. Countries with high childhood mortality (i.e., under 5 mortality rate of >50 deaths/1000 births) need to make the introduction of these multicomponent PCVs a high priority.[1]

As per the report by Centers for Disease Control and Prevention (CDC), pneumococcal vaccination is recommended for all children younger than 2 years old and all adults 65 years or older.[2] The CDC also recommends that people between 2 and 64 years of age with medical conditions such as chronic heart, liver, kidney, or lung (including chronic obstructive lung disease, emphysema, and asthma) disease; diabetes; alcoholism; HIV/AIDS; cancer; damaged/absent spleenwith cochlear implants or cerebrospinal fluid leaks); and smokers should also receive pneumococcal conjugate vaccine (PCV13 or Prevnar 13).[2] Countries across the world (with routine use of PCV) have registered a dramatic reduction in the incidence of serious diseases due to the organism, with virtual disappearance of disease due to the serotypes of the organism in the vaccines used.

Experience from both developed and developing countries has shown that carriage of vaccine-type serotypes is consistently reduced by vaccination with PCV.[3-6] However, the effect of PCV on nonvaccine-type invasive pneumococcal disease is difficult to predict.

As per a study in England and Wales, the overall effect of PCV is now being attenuated by the increase in non-PCV13 invasive pneumococcal disease. This attenuated effect is being observed in both adults aged 65 years and older and children younger than 5 years.[5] The fact that these two age groups have the highest incidence of pneumococcal-attributable disease raises public health concern. As per this study, this increase in non-PCV13 invasive pneumococcal disease involved a broad range of serotypes, suggesting that the next generation of high-valency vaccines with narrow additional serotype coverage might have limited public health benefit. Probably, our experience in other settings with mature PCV13 programs and in countries that use PCV10 will add impetus to the development of universal pneumococcal vaccines, such as those based on the identification of conserved protective protein antigens. This will help offset the negative effect of PCV on nonvaccine-type invasive pneumococcal disease.

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