World Pneumonia Day: Fighting pneumonia with safe and affordable vaccines

The second annual World Pneumonia Day – November 12, 2010 – presents an opportunity for the global health community to reflect upon the significant progress that has been made to date in combating pneumonia, and to articulate the remaining critical tasks.

Regarding progress, much of it can be attributed to the remarkable success of vaccination programs in the developed world. Vaccines represent an enormous step forward, protecting children from deadly diseases for a lifetime with just a few doses. They also remain one of the most cost-effective and proven health interventions available in fighting the disease. In developed countries, like the United States, where vaccination programs have been established for years, infant mortality rates from pneumonia have been significantly reduced. In 1939, 24,637 children died of pneumonia; by 1996 it was 800 (a 97% decrease in mortality)[1].

Reflect upon the significant progress that has been made to date – presents an opportunity for the global health community to inhibit infection from the other leading cause of pneumonia: Streptococcus pneumoniae. Following its introduction in 2000, the PCV7 vaccine was found to reduce the rate of invasive disease in children under 2 years in the United States by 69% [9]. An additional study of the efficacy of PCV7 published in JAMA found a similar reduction in rates of invasive disease in young infants age 2–23 months. The study also signaled signs of herd immunity, finding reduced pneumococcal carriage rates in infants too young to have received PCV7 [9]. Research also indicates that the benefits of PCV7 go beyond the covered serotypes. A separate study tracking acute respiratory infections (ARI) in children under 2 years of age demonstrated a more than 20% reduction in non-pneumonia ARI in children after the introduction on PCV7 [10].

As S. pneumoniae causes between 1 and 4 million episodes of pneumonia in Africa each year, PCV efficacy is particularly important in reducing pneumonia’s burden across the continent [11]. While there have been initial concerns about the efficacy of the PCV7 in the developing world, the 9-valent pneumococcal conjugate vaccine (containing serotypes 1 and 5 in addition to those of PCV7), has demonstrated high levels of effectiveness in field studies. In the largest study of its kind encompassing almost 40,000 infants, researchers in South Africa found that PCV9 was 83% effective in reducing the incidence of a first episode of invasive pneumococcal disease (IPD) from the 9 serotypes covered in the vaccine. In addition the vaccine reduced the incidence of IPD caused by penicillin-resistant strains by 67% and IPD caused by trimethoprim–sulfamethoxazole resistant strains by 56% [12]. The vaccine also shows promise for reducing pneumonia’s burden on HIV-infected children, whose risk for vaccine-preventable invasive disease is almost 60 times higher than non-HIV infected children. While PCV9 efficacy rates are lower in HIV–infected children, given the substantial disease burden, the actual reduction in pneumonia would be 15 times greater when compared with non-HIV infected children [13].

A second major study in the Gambia also underscored the efficacy of the 9-valent vaccine in Africa. In this study researchers found the vaccine was 77% effective against invasive pneumococcal disease caused by the 9 serotypes targeted, as well as 37% effective at delivering increased protection against all types of severe pneumonia [14]. While PCV9 has been proven effective in controlling bacterial pneumonia, the benefits of pneumococcal conjugate vaccines have proven to carry over to cases of pneumonia believed...
to be of viral origin as well. A separate study conducted in South Africa found that PCV9 prevents 31% of pneumonias associated with seven respiratory viruses common in South African hospitals [15], underscoring the broader benefits of the vaccine.

Leveraging Hib and pneumococcal conjugate vaccines to control infection from Hib and S. pneumoniae is the key to reducing pneumonia’s burden globally. The problem to date in combating pneumonia is not the effectiveness of the available interventions, but the availability of those interventions to those who need them most. Less than 30% of all children born in developing countries are routinely vaccinated for Hib and only 7% receive PCV vaccines [16].

Recent progress has been made to reduce the cost barrier to vaccination. In 2010, with the support of the Bill & Melinda Gates Foundation, The Global Alliance for Vaccines and Immunization (GAVI) – a global health partnership between the private and public sectors committed to increasing access to immunization in developing countries – launched the Advance Market Commitment (AMC), a program designed to reduce existing cost-barriers to expanding vaccination programs where the disease burden is highest. The AMC will establish long-term contracts between GAVI and vaccine manufacturers that build incentives for the production of greater volumes of vaccines that can be obtained at lower unit costs for eligible countries. What the AMC achieves for low-income countries is access to pneumococcal vaccines at prices that are approximately 95% less than the market price in industrialized countries, essentially removing price barriers that have stalled vaccine distribution and availability for years. This has the power to play a major role in increasing vaccination coverage to 90% in developing countries during the decade, and to save an estimated 8 million children’s lives over the next 10 years [17].

Moving forward and particularly on World Pneumonia Day, it is critical that we, as a community of scientists, infectious disease specialists, and vaccinologists, join together to push for significant progress in reducing the prevalence of pneumonia worldwide and across the life span. We must use our collective expertise to provide data and knowledge to decision makers to ensure the right interventions reach the populations who need them most. We must encourage donor countries to meet their funding commitments. We must encourage developing country governments to make investments and health system improvements to ensure that vaccines and antibiotic treatments reach last-mile communities where there are desperate needs. And we must encourage industry to develop new vaccines with serotypes that are more efficacious in preventing disease in developing-country populations. If we join together to strategically combat pneumonia, we can help ensure real progress is made toward better control of this deadly disease, resulting in improved health for populations, and improved economic productivity by preventing illness and death among the next generation.

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References