Asthma and Invasive Pneumococcal Disease in the Age of Pneumococcal Conjugate Vaccines

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The widespread use of pneumococcal conjugate vaccines (PCVs) in the United States has led to a significant decrease in invasive pneumococcal disease (IPD) and pneumonia in the pediatric population. On the basis of data reported by the Centers for Disease Control and Prevention (CDC), the overall incidence of IPD among children <5 years of age in the United States decreased from 95 cases per 100,000 in 1998 to 9 cases per 100,000 in 2016, and, similarly, the incidence of IPD caused by 13-valent PCV serotypes decreased from 88 cases per 100,000 in 1998 to 2 cases per 100,000 in 2016.\(^1\)\(^2\)

However, IPD still remains a leading cause of morbidity and mortality in the United States and worldwide. In 2017, the CDC’s Active Bacterial Core surveillance network reported that there were 31,000 cases of IPD (meningitis, bacteremia, and bacteremic pneumonia) and 3,590 deaths, of which 147 cases and 9 deaths occurred in children <5 years of age.\(^2\)

Asthma has been described as the most common chronic disease of childhood. In the United States, the CDC estimates that 6 million children <18 years of age have asthma, with a higher incidence in boys and African American children.\(^3\)

Of note, male sex and African American race are also considered risk factors for the development of IPD and pneumonia.\(^4\)\(^–\)\(^6\) The combination of these risk factors places these children at a significantly higher risk for developing both of these illnesses, the combination of which may lead to more complications and less favorable clinical outcomes.

Multiple studies performed in both children and adults with asthma have revealed that these patients are at higher risk for both IPD and pneumococcal pneumonia, with odds ratios between 1.3 and 13.5 for pneumonia and 1.3 and 16.8 for IPD. The risk was found to be substantially higher for persons receiving inhaled or systemic corticosteroid therapy and those with more severe asthma at baseline. These patients are at higher risk not only for IPD and pneumonia but also for the development of complications associated with pneumococcal infections.\(^7\)\(^–\)\(^10\)

In the review being published in this issue of Pediatrics, Castro-Rodriguez et al\(^11\) performed a meta-analysis of 4 electronic databases to evaluate the risk of IPD or pneumococcal pneumonia among children who had been diagnosed with asthma compared with children without asthma in the age of widespread use of PCV. Their meta-analysis was based on data from 4 studies, (3 retrospective cohort studies representing an estimated 26 million person-years and 1 case-control study of 3294 children). The meta-analysis revealed that despite widespread PCV use, children with asthma continued to have a substantially higher risk of IPD and pneumococcal pneumonia compared with children without asthma.

The findings of this meta-analysis reveal several important facts of which...
pediatric health care providers need to be cognizant. First, asthma remains a risk factor for IPD and pneumococcal pneumonia even in the era of widespread use of PCV. Second, it is important that all patients, especially those with asthma, are receiving their vaccinations on time and, most notably, are up to date on their pneumococcal vaccinations. This will provide the best protection against pneumococcal infections and their complications for pediatric patients with asthma.

**ABBREVIATIONS**

CDC: Centers for Disease Control and Prevention  
IPD: invasive pneumococcal disease  
PCV: pneumococcal conjugate vaccine

**REFERENCES**

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