Articles

Effectiveness of 13-valent pneumococcal conjugate vaccine for prevention of invasive pneumococcal disease in children in the USA: a matched case-control study

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Summary

Background

In 2010, 13-valent pneumococcal conjugate vaccine (PCV13) was licensed and recommended in the USA for prevention of invasive pneumococcal disease in children. Licensure was based on immunogenicity data comparing PCV13 with the earlier seven-valent formulation. Because clinical endpoints were not assessed for the new antigens, we did a postlicensure matched case-control study to assess vaccine effectiveness.

Methods

Cases in children aged 2–59 months were identified through active surveillance in 13 sites. Controls were identified via birth registries and matched to cases by age and postal (zip) code. The primary objective was the vaccine effectiveness of at least one dose against the 13 serotypes included in PCV13. Secondary objectives included vaccine effectiveness against all-cause invasive pneumococcal disease, against antibiotic non-susceptible invasive pneumococcal disease, and among children with and without underlying conditions. Vaccine effectiveness was calculated as (1 – matched odds ratio) × 100%.

Findings

We enrolled 722 children with invasive pneumococcal disease and 2991 controls; PCV13 serotype cases (217 [30%]) included most commonly serotypes 19A (128 [18%]), 7F (32 [4%]), and 3 (43 [6%]). Vaccine effectiveness against PCV13 serotypes was 86·0% (95% CI 75·5 to 92·3), driven by serotypes 19A and 7F, for which vaccine effectiveness was 85·6% (95% CI 70·6 to 93·5) and 96·5% (82·7 to 100), respectively. We also identified statistically significant effectiveness against serotype 3 (79·5%, 95% CI 30·3 to 94·8) and against antibiotic non-susceptible invasive pneumococcal disease (65·6%, 44·9 to 78·7). Vaccine effectiveness against all-cause invasive pneumococcal disease was 60·2% (95% CI 46·8 to 70·3). Vaccine effectiveness was similar among children with (81·4%, 95% CI 45·4 to 93·6) and without (85·8%, 74·9 to 91·9) underlying conditions.

Interpretation

PCV13 appears highly effective against invasive pneumococcal disease among children in the USA in the context of routine and catch-up schedules, although some new vaccine antigens could not be assessed. PCV13 immunisation provides a robust strategy for combating pneumococcal antimicrobial resistance.

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