Session K2.1

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Changing epidemiology of invasive pneumococcal disease (IPD) following six years of 13-valent pneumococcal conjugate vaccine (PCV13) use in the United States
Ryan Gierke, Monica Farley, William Schaffner, Ann Thomas, Arthur Reingold, Lee Harrison, Ruth Lynfield, Jemma Rowlands, Susan Petit, Meghan Barnes, Chad Smelser, Cynthia Whitney, Tamara Pilishvili

Submitter Email: ipe3@cdc.gov

Background:
Thirteen-valent pneumococcal conjugate vaccine (PCV13) was recommended for children aged <5 years in February 2010 and for adults aged ≥65 years, in series with 23-valent polysaccharide vaccine (PPSV23), in August 2014.

Objectives:
We evaluated impact of PCV13 on invasive pneumococcal disease (IPD) among children (direct effects) and adults (direct and indirect effects) 6 years post-introduction.

Methods:
IPD cases (isolation of pneumococcus from sterile sites) were identified through Active Bacterial Core surveillance (ABCs) during January 2007 - December 2016. Isolates were serotyped by Quellung or whole genome sequencing and classified by vaccine type (PCV13, PPSV23-unique, non-vaccine). Incidence changes were estimated as percent changes (one minus rate ratio) and rate differences between pre-PCV13 (2007-2008) and post-PCV13 (2016) periods. Proportions of IPD clinical syndromes were compared pre- and post-PCV13 introduction.

Results:
Of 34,858 IPD cases identified, 3,113 were in children aged <5 years and 12,199 in adults aged ≥65 years. Overall IPD rates decreased significantly in children (61%, 95%CI 53-68%) and adults (40%, 95%CI 35-68%). PCV13-type IPD decreased by 87% (95%CI 82-91%) in children and 68% (95%CI 63-72%) in adults. During the post-PCV13 period, 27% of IPD was due to PCV13 serotypes. No significant increases occurred in non-PCV13-types. Among adults, the proportion of cases with meningitis did not change (3%) pre- vs. post-PCV13, while the proportion with pneumonia decreased from 76% to 72% (p=0.02). Among children, the proportion of cases with meningitis increased from 8% to 14%, (p=0.03), while the proportion with pneumonia decreased from 35% to 27% (p=0.05). Case-fatality ratio did not change among adults (15%), but increased from 1% to 5% among children (p<0.01).

Conclusion:
IPD incidence among children and adults decreased following PCV13 introduction, with no evidence of non-PCV13-type replacement disease. Increased IPD severity in children post-PCV13 introduction suggests increased risk of non-vaccine type IPD among medically fragile children.
Background:
In 2014, the Advisory Committee on Immunization Practices (ACIP) recommended PCV13 for all adults aged ≥65 years, in series with PPSV23. Because of indirect (herd) effects from pediatric PCV13 use, decreases in invasive pneumococcal disease (IPD) rates among adults were observed before this recommendation. To examine the long-term utility of routine PCV13 use among adults aged ≥65 years, ACIP plans to evaluate post-licensure data on PCV13 effects on adult disease burden in a setting of herd effects.

Setting:
United States

Population:
Adults aged ≥65 years

Project Description:
To evaluate ongoing need for the 2014 PCV13 recommendation, we will evaluate a multi-site case-control study of PCV13 effectiveness among adults aged ≥65 years, monitor PCV13 impact on IPD and non-invasive pneumonia among adults with and without indications for PCV13 use, and use mathematical models to estimate the contribution of direct and indirect PCV13 effects to observed trends among adults. Additionally, we will examine published literature and summarize the evidence for PCV13 use among adults using a systematic approach (Grading of Recommendations Assessment, Development and Evaluation [GRADE]). A comprehensive overview of the evidence will be presented to ACIP in late 2018.

Results/Lessons Learned:
Reviewing evidence for established vaccine recommendations is important for ensuring current and effective public health policy. Pneumococcal conjugate vaccines have been very effective in reducing vaccine type IPD among vaccinated children and unvaccinated adults (indirect effects). Because of these indirect effects, separating direct and indirect effects of PCV13 after the 2014 recommendation is challenging. At the individual level, PCV13 effectiveness among adults aged ≥65 years can be evaluated using case-control studies. Estimating population-level PCV13 impact using surveillance data requires mathematical models that incorporate vaccine coverage; these models help to examine PCV13 direct and indirect effects on disease burden among adults aged ≥65 years.