Impact of PCV13 on Invasive Pneumococcal Disease (IPD) Burden and the Serotype Distribution in the U.S.

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Methods

- **Active Bacterial Core surveillance (ABCs):**
  - Active laboratory and population-based surveillance, 10 sites
  - Pneumococcus isolation from sterile site

- **Isolates serotyped by Quellung or PCR at reference labs and grouped for analysis:**
  - PCV13: 13 types included in PCV13 +6C (cross protection)
  - NVT: Types not included in PCV13

- **US Census Bureau:**
  - Race-bridged post-census population estimates as denominators

- Overall and serotype-specific IPD incidence rates (cases per 100,000)
IPD rates among children <5 years old, 2007–2017

- **PCV13 introduction for children**

- **ALL IPD**
- **PCV13 + 6C**
- **NVT**
IPD rates among adults ≥65 years old, 2007–2017
IPD caused by PCV13 serotypes and type 6C among children <5 years old, 2007–2017

Cases per 100,000

Year


PCV13 introduction for children

001
PCV7 (except 19F)
019F
06C
003
07F
019A

IPD caused by PCV13 serotypes and type 6C among children <5 years old, 2007–2017
IPD caused by PCV13 serotypes and type 6C among adults ≥65 years old, 2007–2017

The graph shows the decrease in cases of IPD caused by PCV13 serotypes and type 6C among adults ≥65 years old from 2007 to 2017. The introduction of PCV13 for children in 2010 and for adults in 2016 is marked on the graph. The decrease in cases is depicted by the downward trend in the graph, with the 001 serotype showing the largest decrease. The serotypes 001, PCV7 (except 19F), 19F, 06C, 003, and 07F are represented by different colors, with each color trend line indicating the decrease in cases over the years.
Changes in serotype 3 incidence, 1998–2017

Children <5 years

Adults ≥65 years
IPD rates among children <5 years old, 2007-2017, top 10 serotypes 2016-2017
IPD rates among children <5 years old, 2007-2017, top serotypes 2016-2017 (excluding 19A)
IPD rates among children <5 years old, 2007-2017, top serotypes 2016-2017 (excluding 19A)

A hypothetical PCV15 (PCV13+2NVT) in children:
- 2 top NVT: 33F, 23B
- Preventable burden: <2 cases/100K
- Estimated US cases: 260
IPD rates among children <5 years old, 2007-2017, top serotypes 2016-2017 (excluding 19A)

A hypothetical PCV20 (PCV13+7NVT) in children:
- 7 top NVT: 33F, 23B, 22F, 15C, 35B, 15A, 38
- 48% of IPD in 2016-2017
- Preventable burden: 3 cases/100K
- Estimated US cases: ~700

A hypothetical PCV20 (PCV13+ 7 pediatric NVTs) in children:
- 7 top pediatric NVT: 33F, 23B, 22F, 15C, 35B, 15A, 38
- 35% of IPD in 2016-2017
- Preventable burden through indirect effects: ~11 cases/100K
- Estimated US cases: ~10,000
- ~60-70% reduction expected through indirect PCV effects

A hypothetical PCV20 (PCV13+7 adult NVTs) in adults and PCV13 for children:
• 7 top adult NVT: 22F, 35B, 23A, 15A, 33F, 11A, 9N
• 42% of IPD in 2016-2017
• Preventable burden: 9 cases/100K
• Estimated US cases: ~12,000
• ~30% reduction expected through direct effects
  (in a setting of a 45% coverage and 60% VE)
Conclusions

• Overall IPD incidence significantly lower in 2016-2017 following PCV13 introduction for children
  • Reductions driven by serotypes 19A, 7F, and 6C (cross-protection)
  • No changes in type 3 IPD during 2007-2017
  • Rates have plateaued since 2014

• PCV13 direct effects on IPD among adults ≥65 years old were likely very limited during this observation period

• No evidence of serotype replacement

• New PCVs covering top 7 NVT pediatric strains would target a relatively small IPD burden in children (~3 cases/100,000)

• The same PCV for children has the potential of reducing a large burden among adults 65 years or older through indirect effects
Thank you!

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.