

The Effect of Pneumococcal Conjugate Vaccines on Invasive Pneumococcal Disease Amongst Children in Ireland, 2007-2014

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Introduction

- The majority of invasive pneumococcal disease (IPD) infections are caused by a subset of predominant *Streptococcus pneumoniae* serotypes, which are included in the pneumococcal conjugate vaccines (PCV's).
- The 7-valent PCV was introduced in September 2008, followed by the 13-valent PCV in December 2010 (**Table 1**).

Objective

- To assess the serotype distribution and antimicrobial resistance associated with IPD in children <5 years of age following the introduction of PCV's in Ireland.

Methods

- S. pneumoniae* isolates from sterile sites were submitted for serotyping using multiplex-PCR and serological co-agglutination.
- Susceptibilities to penicillin, cefotaxime and erythromycin were determined using the E-test method and CLSI guidelines for meningitis.

Figure 1: IPD in patients < 2 years of age

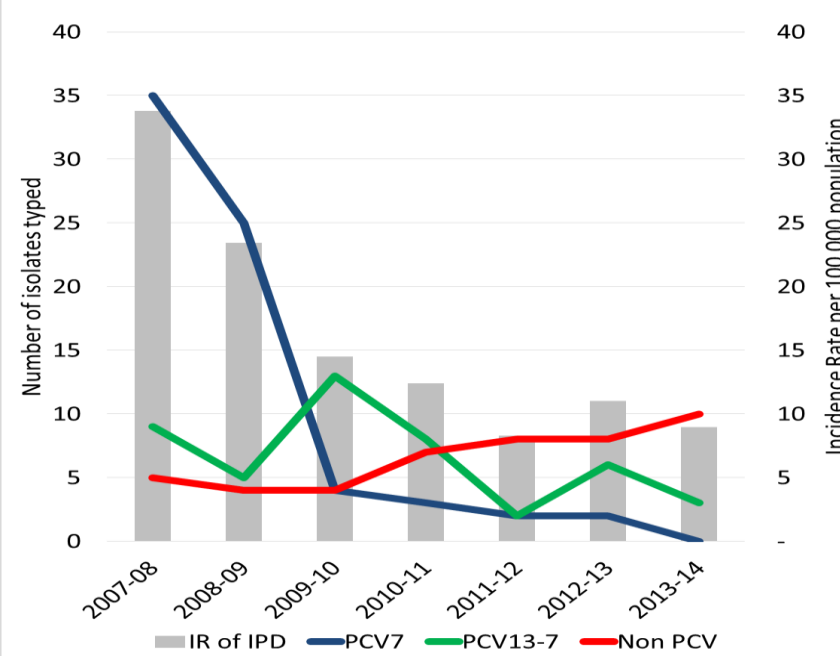


Figure 2: IPD in patients 2 - < 5 years of age

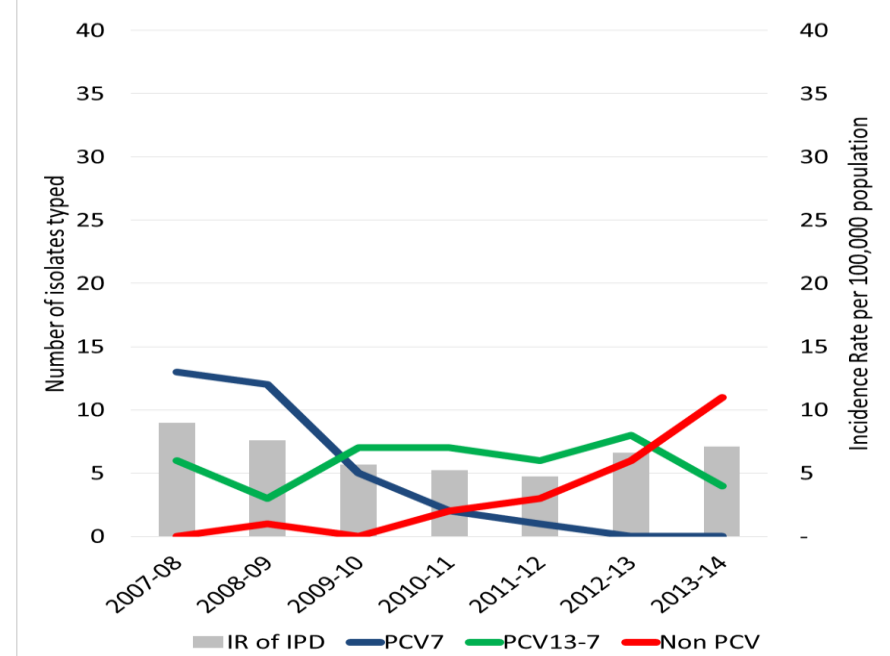
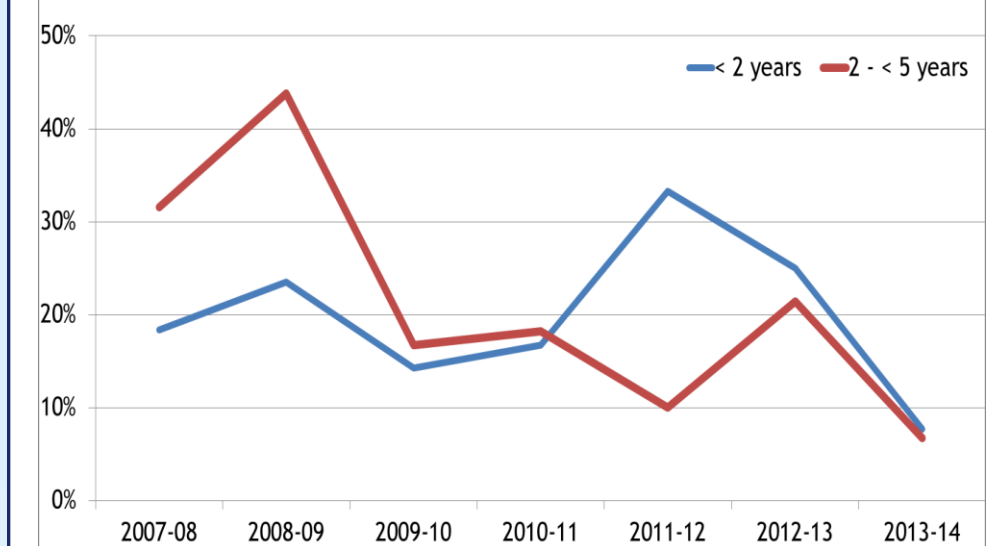


Figure 3: % PNSP in patients <5 years of age



Results

- There was a total of 260 IPD isolates typed in children between July 2007 and June 2014.

Children <2 years of age (n=163)

- Predominant serotypes were 14 (n=25), 7F (n=22), 19A (n=16), 6B (n=12) and 19F (n=11).

When the results for 2007-08 were compared to 2013-14, there was:

- 74% decline in total number of IPD isolates typed.
- 100% decline in PCV7 serotypes. **Blue line in Figure 1.**
- 67% decline in the additional serotypes in PCV13 but not PCV7 (PCV13-7) serotypes. **Green line in Figure 1.**
- 50% increase in the number of non-PCV associated serotypes. **Red line in Figure 1.**

Children 2 - <5 years of age (n=97)

When the results for 2007-08 were compared to 2013-14, there was:

- 21% decline in IPD from 2007-08 to 2013-14.
- 100% decline in PCV7 serotypes. **Blue line in Figure 2.**
- 33% decline in PCV13-7 serotypes. **Green line in Figure 2.**
- There was a significant increase in the number of non-PCV associated serotypes (n=0, 11, p<0.001). **Red line in Figure 2.**

Antimicrobial susceptibility

- Penicillin non-susceptible pneumococci (PNSP) fell from 22% in 2007-08 to 7% in 2013-14 due to a decline in 14 and 9V (both in PCV7). **Figure 3** outlines the overall trends of PNSP in children.
- Cefotaxime and erythromycin resistance fell from 19 to 7% and 13 to 11%, respectively.

Conclusion

- PCV vaccination has had a very positive impact in children even if the number of non-PCV associated IPD isolates has increased.
- Continuing surveillance to determine changes in predominant serotypes and antimicrobial resistance will inform future vaccine policies and the choice of empiric antibiotic treatment.

Table 1	Serotypes covered	Recommendation
PCV7	4, 6B, 9V, 18C, 19F, 23F	Routine infants schedule and catch-up campaign for children < 2 years - Commenced Sept. 2008
PCV13	PCV7 + 1, 3, 5, 7F, 6A, 19A	Routine infant schedule - Commenced Dec. 2010

Acknowledgements

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