INCREASING ROLE OF SEROTYPE 3 IN INVASIVE PNEUMOCOCCAL DISEASE IN GERMANY, 2000-2016

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BACKGROUND AND AIMS

Serotype 3, despite inclusion in the latest pneumococcal conjugate vaccine, persists as a major cause of invasive pneumococcal disease in Germany.

The infant PCV recommendation was given in 2006 (3+1 schedule) and changed in 2015 (to 2+1). Germany lacks a PCV recommendation for older adults. We sought to describe the expansion of serotype 3 as a cause of IPD.

METHODS

3965 serotype 3 isolates were identified by Neufeld-Quellung reaction at the German National Reference Center for Streptococci from July 1, 2000 to June 30, 2017.

RESULTS

In children under 2 and adults over 60, estimated incidence increased from 0.22 to 0.45, and 0.64 to 2.09 cases per 100,000, respectively. Of 55 serotype 3 IPD cases in children born after the release of PCV13 with a known vaccination status, 31 received at least 1 dose of PCV13, but only 5 children had received the appropriate number of doses in the recommended timeframes.

Figure 1. Increasing incidence of Invasive Pneumococcal Disease caused by Serotype 3 in Germany. The incidence of serotype 3 IPD in children under 3 and adults 65 years and older is shown for 2006-2007 and 2016-2017.

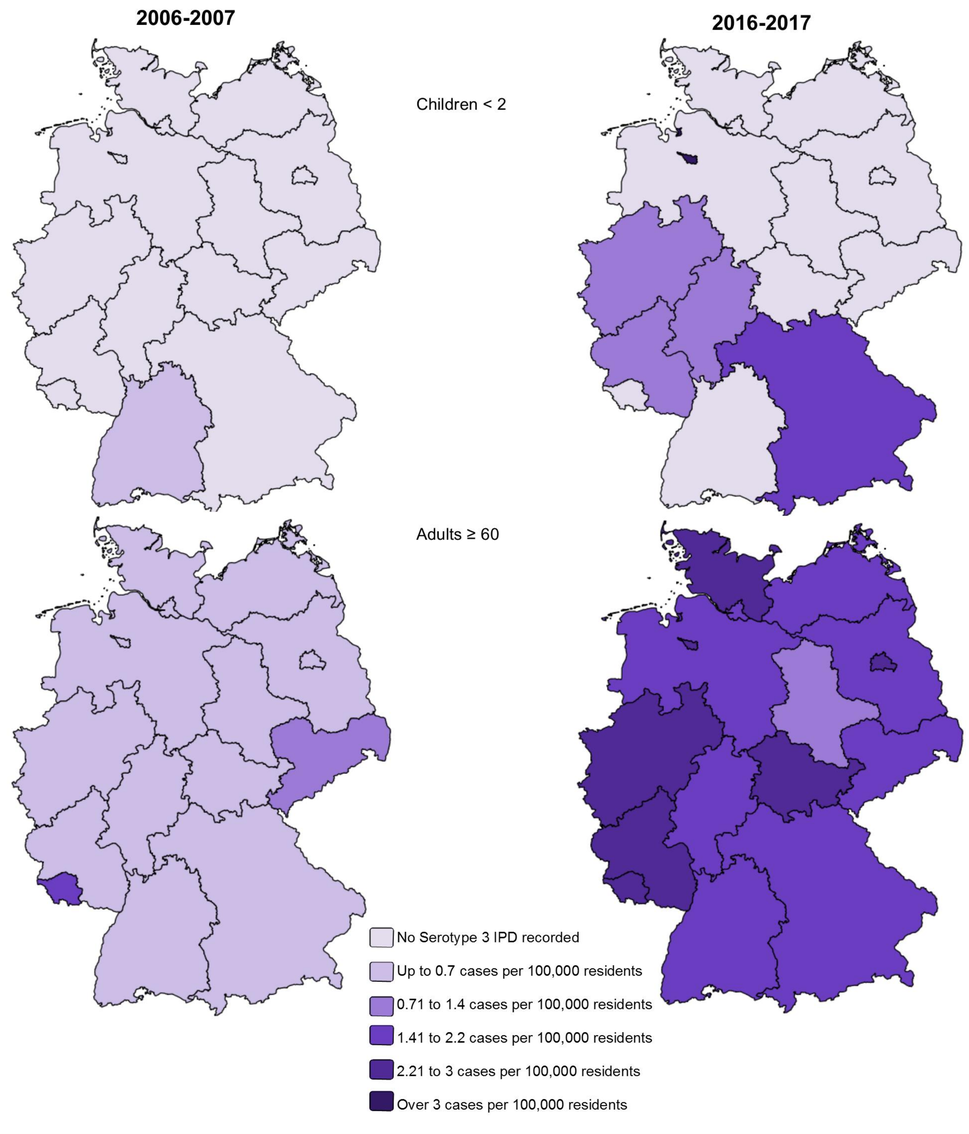


Table 1. Serotype 3 IPD cases in German children by vaccination status. Columns with an asterisk are children correctly vaccinated according to the 3+1 vaccination schedule

			Vaccinated At All					
		Unvaccinated	PCV7		PCV10		PCV13	
Season	n			*		*		*
2007-2008	3	2	1	0	0	0	0	0
2008-2009	5	1	4	1	0	0	0	0
2009-2010	4	2	1	1	1	0	0	0
2010-2011	6	3	2	0	0	0	1	0
2011-2012	10	4	2	0	1	1	3	0
2012-2013	4	0	1	0	0	0	3	0
2013-2014	7	1	0	0	0	0	5	0
2014-2015	4	1	1	0	1	0	2	1
2015-2016	6	1	0	0	1	0	4	1
2016-2017	13	1	0	0	1	0	11	2
2017-2018	5	2	0	0	1	0	2	1

CONCLUSIONS

- Serotype 3 IPD cases are on the rise in Germany.
- It is possible that unvaccinated and under-vaccinated children are acting as a niche for young children
- The lack of a nationwide PCV program could be to blame for the rise in older adults.

Figure 2. Increase of Serotype 3 Invasive Pneumococcal Disease across all age groups in Germany. Serotype 3 IPD isolates are shown as a percentage of all IPD isolates submitted to the German National Reference Center for Streptococci from 2000-2001 to the partial season of 2017-2018.

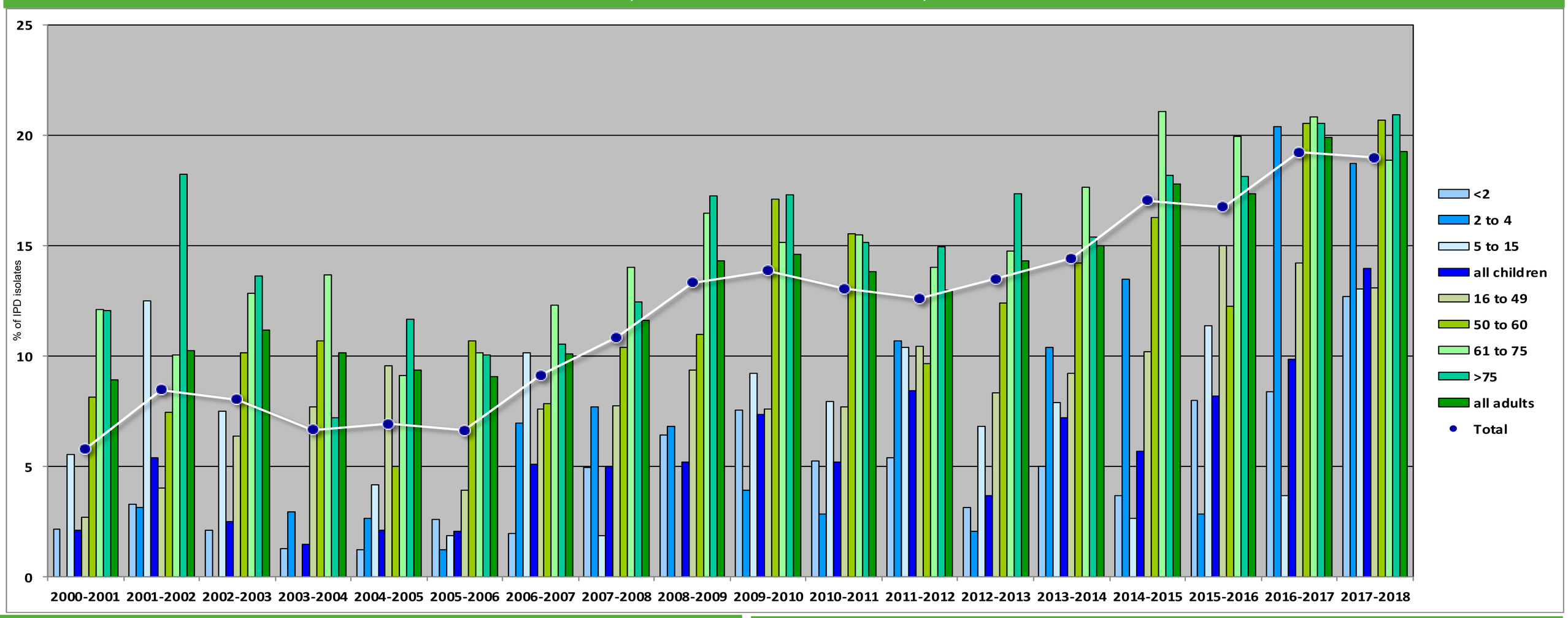
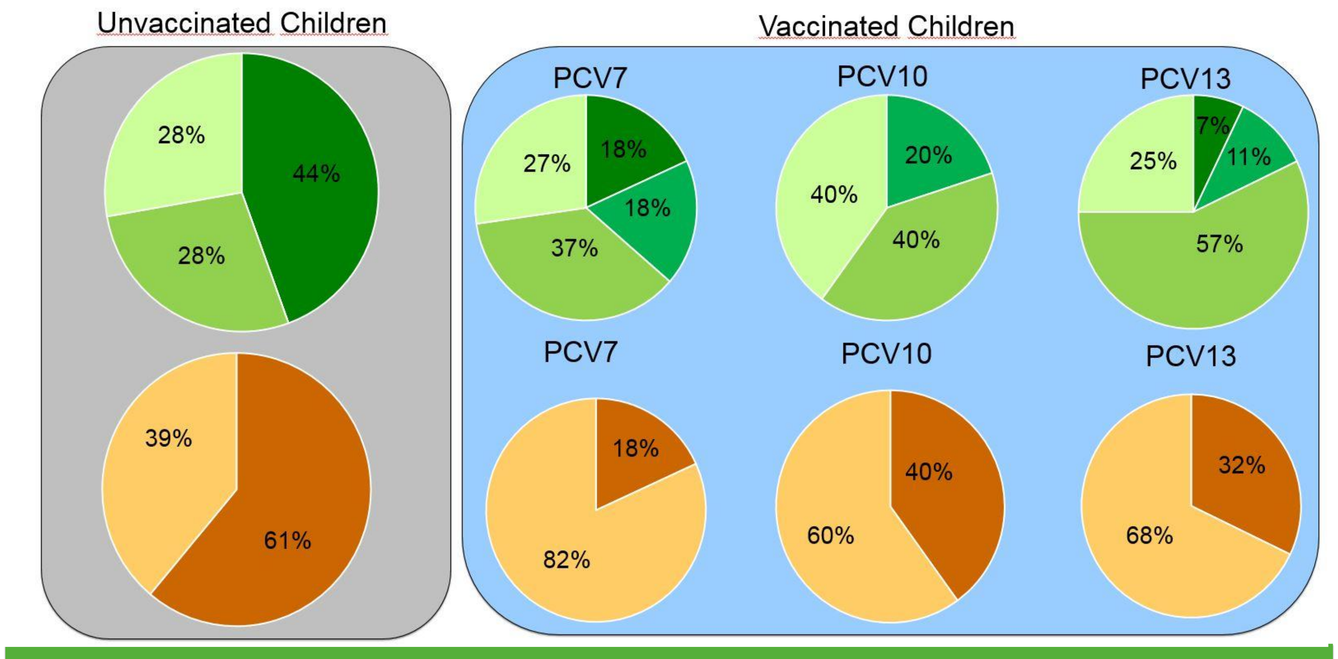


Table 2. Resistance to ≥3 classes of antibiotics and Penicillin Nonsuscpetibility in Serotype 3 IPD cases in Germany, 2000-2001 to the partial season of 2017-2018.
The 2015 CLSI breakpoints were applied. Penicillin Non-Susceptibility (PenNS) was determined using the oral penicillin breakpoints.

Season	Serotype 3 IPD	MDR	Pen NS	Most Common Resistance Profile (number of isolates)
2000-2001	30	0	1	--
2001-2002	56	0	0	--
2002-2003	53	1	1	lincosamide, macrolide, tetracycline (1)
2003-2004	45	0	0	--
2004-2005	59	1	0	phenicol, lincosamide, macrolide, tetracycline, glycopeptide, (1)
2005-2006	56	0	0	--
2006-2007	139	1	0	phenicol, lincosamide, tetracycline (1)
2007-2008	218	0	1	--
2008-2009	300	8	0	lincosamide, macrolide, tetracycline (6)
2009-2010	309	6	1	phenicol, lincosamide, macrolide, tetracycline (2) AND lincosamide, macrolide, tetracycline (2)
2010-2011	331	9	0	lincosamide, macrolide, tetracycline (8)
2011-2012	283	7	0	lincosamide, macrolide, tetracycline (5)
2012-2013	324	5	0	lincosamide, macrolide, tetracycline (3)
2013-2014	322	12	0	phenicol, lincosamide, macrolide, tetracycline (8)
2014-2015	454	12	0	lincosamide, macrolide, tetracycline (9)
2015-2016	478	11	0	phenicol, lincosamide, macrolide, tetracycline (5) AND lincosamide, macrolide, tetracycline (5)
2016-2017	624	12	3	phenicol, lincosamide, macrolide, tetracycline (7)
2017-2018	321	6	2	phenicol, lincosamide, macrolide, tetracycline (3)

Figure 3A and 3B. Distribution of Clinical Diagnoses (3A) and Age (3B) of Serotype 3 IPD cases by Vaccination status in German children <16 years of age.



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