

## FALL AND RISE OF INVASIVE PNEUMOCOCCAL DISEASE AMONG CHILDREN IN GERMANY

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### BACKGROUND

Infant PCV vaccination was universally recommended in Germany in 2006. In 2009, two higher-valent formulations (PCV10, PCV13) were licensed. Since March 2020, the SARS-CoV-2 pandemic has strongly deregulated daily life. Here, we present data on invasive pneumococcal disease (IPD) cases in the era of conjugate vaccination during a worldwide pandemic.

### METHODS

IPD in children in Germany has been monitored since 1997. Isolates were serotyped using the Neufeld Quellung reaction.

### RESULTS

SARS-CoV-2 reached Germany at the beginning of March 2020. In the period March-December 2020, only 79 IPD cases were reported among children <18 years of age, whereas in the same periods in 2018 and 2019 (pre-pandemic), case numbers were 144 and 170, respectively. However, in March-December 2021, case numbers increased again to 132 (Fig. 1).

This drop in case numbers seems to be due to social distancing measures, and not to decreased reporting, as reported Group B-Streptococcus cases showed no comparable reduction (Fig. 2). When restrictive measures were repealed, and schools and daycare centers were opened again (September 2021), IPD case numbers immediately normalized to pre-pandemic levels (Fig. 3).

PCV13 serotypes made up 24.4%, 18.5% and 23.5% of cases in the pre-pandemic seasons 2017-2020,

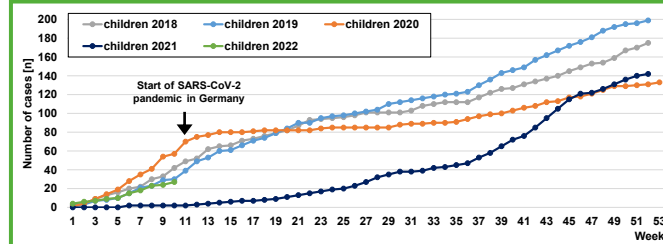


Fig. 1: Cumulative number of reported IPD cases from children <18 years of age in Germany.

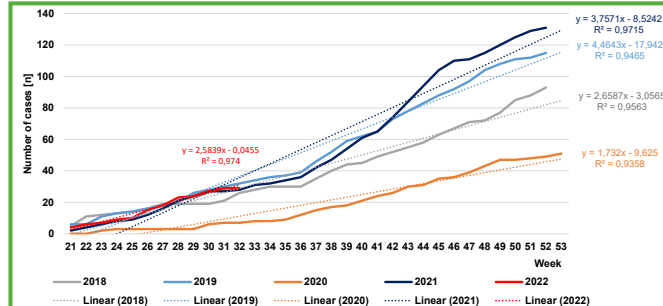


Fig. 3: Cumulative number of reported IPD cases from children <18 years of age in Germany, starting from week 21 (June) in 2018, 2019, 2020, 2021 and 2022.

but only 12.9% in the pandemic season 2020-2021. In the season 2021-2022, 31.8% of cases had PCV13 serotypes (Tab. 1). Prevalence of PCV15 and PCV20 serotypes was also lower in the pandemic season 2020-2021 (17.1% and 41.4%, respectively) than in the seasons before and after. The differences were mainly caused by lower numbers of serotype 3 and 22F cases.

The serotype distribution in the pandemic period (June 2020 – March 2021) differed considerably from the serotype distribution of the pre-pandemic period (June 2019 – March 2020). However, in the post-pandemic period (June 2021 – March 2022), the serotype distribution was similar to the pre-pandemic period (Fig. 4).

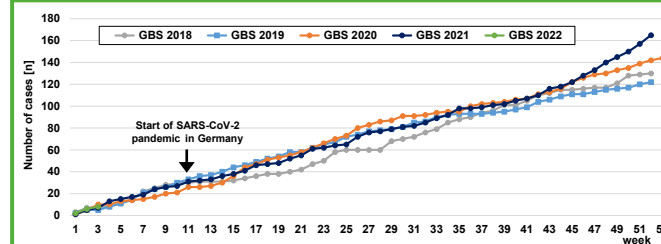


Fig. 2: Cumulative number of reported invasive Group B streptococcal disease among all age groups in Germany.

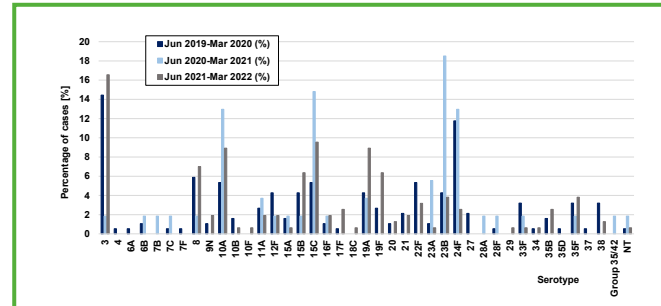


Fig. 4: Serotype distribution [%] in the period June 2019 – March 2020 (pre-pandemic), June 2020-March 2021 (pandemic) and June 2021-March 2022 (post-pandemic).

### CONCLUSIONS

- The SARS-CoV-2 pandemic has had a strong reducing effect on IPD among children in Germany.
- Two times fewer cases were observed, most probably caused by reduced respiratory transmission.
- Interestingly, coverage of current and future vaccine formulations was clearly lower in the season 2020-2021, when lockdown measures were most stringent.
- The serotype distribution was different during the pandemic, with lower levels of serotypes 3 and 22F, but returned to pre-pandemic levels as of June 2021.

Table 1: Serotype distribution among IPD isolates from children <18 years of age in Germany. Single serotype prevalences are ranked.

Serotype	2017-2018	%	Serotype	2018-2019	%	Serotype	2019-2020	%	Serotype	2020-2021	%	Serotype	2021-2022	%
total	180	100.0	total	178	100.0	total	187	100.0	total	70	100.0	total	107	100.0
PPV23	107	59.4	PPV23	108	60.7	PPV23	105	56.1	PPV23	29	41.4	PPV23	69	64.5
PCV20	99	55.0	PCV20	99	55.6	PCV20	100	53.5	PCV20	29	41.4	PCV20	63	58.9
PCV15	58	32.2	PCV15	45	25.3	PCV15	57	30.5	PCV15	12	17.1	PCV15	37	34.6
PCV13	44	24.4	PCV13	33	18.5	PCV13	44	23.5	PCV13	9	12.9	PCV13	34	31.8
PCV10	11	6.1	PCV10	10	5.6	PCV10	9	4.8	PCV10	1	1.4	PCV10	7	6.5
PCV7	5	2.8	PCV7	10	5.6	PCV7	8	4.3	PCV7	1	1.4	PCV7	7	6.5
3	25	13.9	10A	21	11.8	3	27	14.4	15C	10	14.3	3	19	17.8
10A	15	8.3	23B	17	9.6	24F	21	11.2	23B	10	14.3	15C	12	11.2
24F	15	8.3	15B	12	6.7	10A	12	6.4	24F	8	11.4	19A	8	7.5
22F	10	5.6	3	11	6.2	23B	11	5.9	10A	7	10.0	10A	8	7.5
8	10	5.6	19A	11	6.2	15C	10	5.3	19A	6	8.6	8	7	6.5
15C	9	5.0	15C	10	5.6	19A	8	4.3	11A	4	5.7	19F	6	5.6
23B	9	5.0	22F	9	5.1	8	8	4.3	8	3	4.3	15B	6	5.6
19A	8	4.4	12F	9	5.1	12F	8	4.3	23A	3	4.3	24F	4	3.7
12F	8	4.4	19F	7	3.9	15B	8	4.3	3	2	2.9	35F	4	3.7
38	8	4.4	8	7	3.9	22F	7	3.7	22F	2	2.9	12F	3	2.8
1	6	3.3	24F	7	3.9	11A	7	3.7	12F	2	2.9	16F	3	2.8
11A	5	2.8	9N	6	3.4	35F	7	3.7	6B	1	1.4	23B	3	2.8
19F	4	2.2	38	6	3.4	33F	6	3.2	33F	1	1.4	35B	3	2.8
33F	4	2.2	11A	5	2.8	38	6	3.2	15B	1	1.4	22F	2	1.9
17F	4	2.2	27	4	2.2	19F	5	2.7	7B	1	1.4	11A	2	1.9
16F	4	2.2	33F	3	1.7	15A	4	2.1	7C	1	1.4	9N	2	1.9
15B	3	1.7	17F	3	1.7	21	4	2.1	15A	1	1.4	17F	2	1.9
21	3	1.7	21	3	1.7	27	4	2.1	16F	1	1.4	20	2	1.9
23A	3	1.7	23A	3	1.7	35B	3	1.6	25F	1	1.4	15A	2	1.9
27	3	1.7	35B	3	1.7	6B	2	1.1	28A	1	1.4	38	2	1.9
35F	3	1.7	23F	2	1.1	9N	2	1.1	28F	1	1.4	18C	1	0.9
9N	2	1.1	10B	2	1.1	20	2	1.1	35B	1	1.4	33F	1	0.9
20	2	1.1	15A	2	1.1	10B	2	1.1	35D	1	1.4	10F	1	0.9
10B	2	1.1	28F	2	1.1	16F	2	1.1	NT	1	1.4	21	1	0.9