

## Invasive Pneumococcal Disease Quarterly Report July–September 2021

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### Background

Since 17 October 2008, invasive pneumococcal disease (IPD) has been notifiable to the local Medical Officer of Health under the Health Act 1956. The pneumococcal conjugate vaccine (PCV) was added to the New Zealand childhood immunisation schedule on 1 June 2008, and has since undergone a number of changes: • Prevenar® (PCV7) was used from June 2008 to June 2011, • Synflorix® (PCV10) was used from July 2011 to June 2014, • Prevenar13® (PCV13) was used from July 2014 to June 2017, • Synflorix® (PCV10) has been used since July 2017.

PCV10 includes the seven serotypes in PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F) as well as serotypes 1, 5 and 7F, and some cross-reactivity to serotype 19A. PCV13 includes the 10 serotypes in PCV10 as well as serotypes 3, 6A and 19A. The recommended schedule is now three doses, given at 6 weeks, 5 months and 12 months of age. In addition, PCV13 and the 23-valent pneumococcal polysaccharide vaccine (23PPV, Pneumovax 23) are recommended for individuals with medical conditions that increase the risk of IPD. 23PPV includes the 13 serotypes of PCV13 as well as serotypes 2, 8, 9N, 10A, 11A, 12F, 15B, 17F, 20, 22F and 33F.

The data presented in this report (except for immunisation status) is based on the information recorded on EpiSurv, the national notifiable disease surveillance system, as at 1 October 2021. Any changes made to EpiSurv data by public health unit staff after this date will not be reflected in this report. Immunisation status of cases that were eligible for PCV vaccination was extracted from the National Immunisation Register (NIR).

Reporting of cases compared to a threshold is completed at the end of each quarter for the previous 12-month period. A 12-month period is used due to the small number of cases. If the incidence for a particular 12-month period exceeds the threshold further assessment will be undertaken to evaluate the role of PCV-10 vaccine re-introduction after PCV-13.

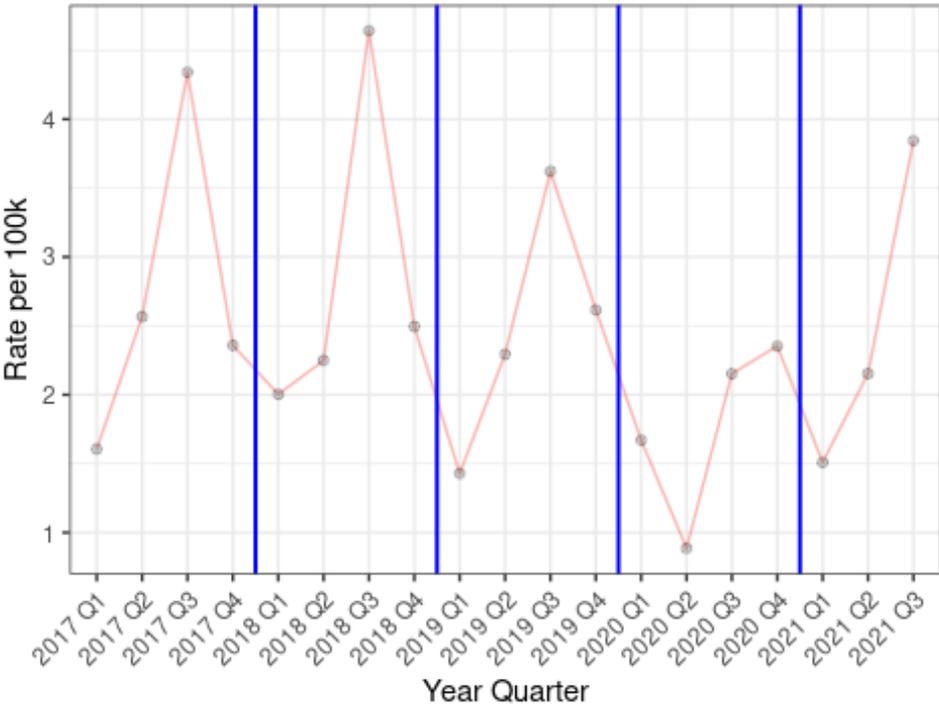
Note: a threshold breach does not confirm that the change in vaccination type is the explanation, but it indicates the need to investigate further. Further investigation will look into case-specific factors, such as immunisation status, the presence of underlying health conditions or risk factors which may have predisposed the case to disease, and contextual factors, such as the incidence of other vaccine and non-vaccine serotypes.

These quarterly and threshold reports are part of an enhanced surveillance programme to monitor the impact of PCV vaccination, including the changes in vaccine valency, on the epidemiology of IPD in New Zealand.

### Quarterly Rates of IPD

There were 191 IPD cases notified in the July–September 2021 quarter, compared with 107 cases in Q3 2020 and 180 cases in Q3 2019. IPD diagnoses follow a seasonal pattern with a winter peak and summer trough (Figure 1).

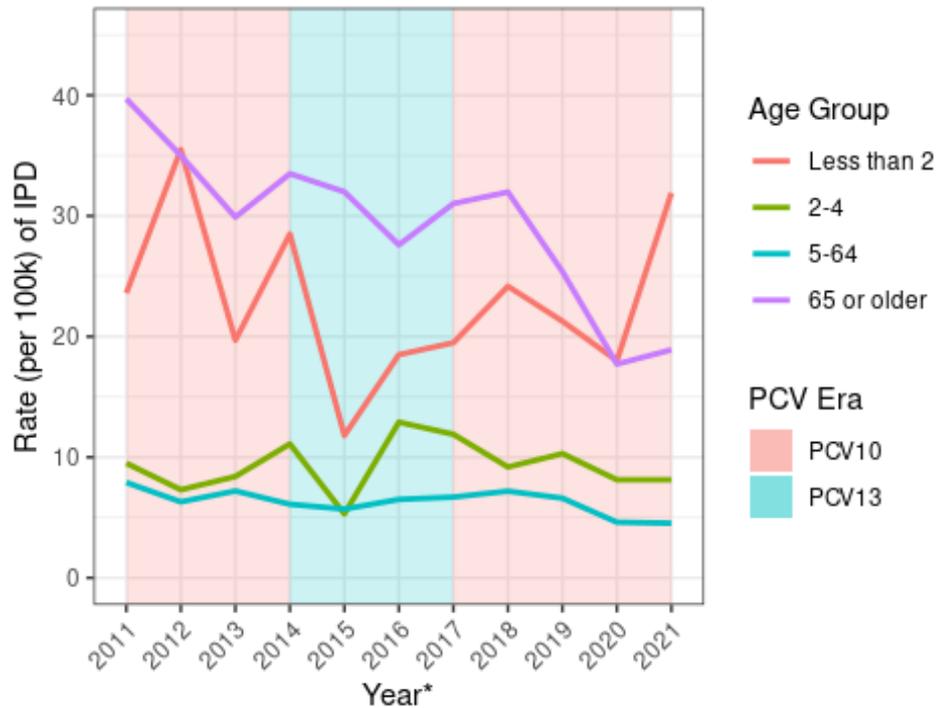
**Figure 1: Quarterly IPD rates (2017-2021)**



### Annual Rates of IPD

Importantly, the annual rate of IPD for 2021 is for only Q1 to Q3. Additionally, there were 29% fewer IPD cases in 2020 likely due to COVID-19 control measures and border closures. The rates of IPD have remained relatively stable for children 2-4 and 5-64 year olds (Figure 2). The rate of IPD among those 65 or older through Q3 2021 is approximately equal to the rate at the end of 2020. However, for children under 2 the rate of IPD through Q3 2021 is now the highest since 2012.

Figure 2: Annual rate of IPD by age group and PCV era (2011-2021\*)

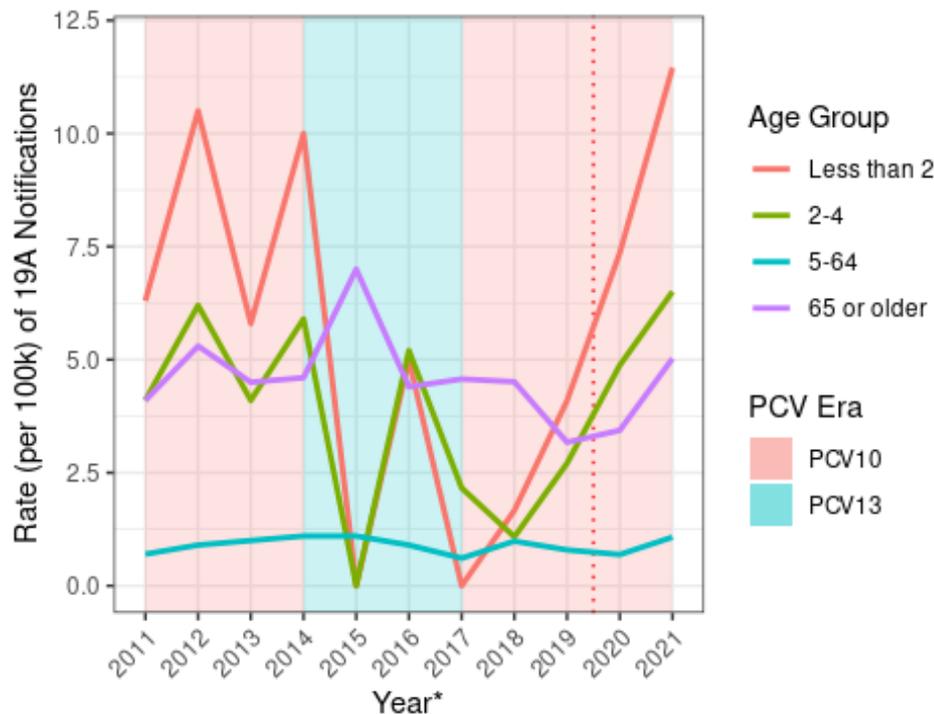


\*Through Q3 2021 only.

### Annual Rates of Serotype 19A

The rate of serotype 19A for children under 2 years has steadily increased since 2017 (Figure 3). Through Q3, the rate of 19A in 2021 among children under 2 years is now the highest since before PCV10 was first introduced in 2011. Similarly, the rate of 19A for children 2-4 in 2021 through Q3 is now also the highest it has been since before PCV10 was introduced in 2011. The rates of serotype 19A for 2021 through Q3 among 5-64 year olds and 65 or older are the highest they have been since 2015.

Figure 3: Annual rate of 19A by age group and PCV era (2011-2021\*)



\*Through Q3 2021 only.

### Threshold Analyses (12 Months Ending September 2021)

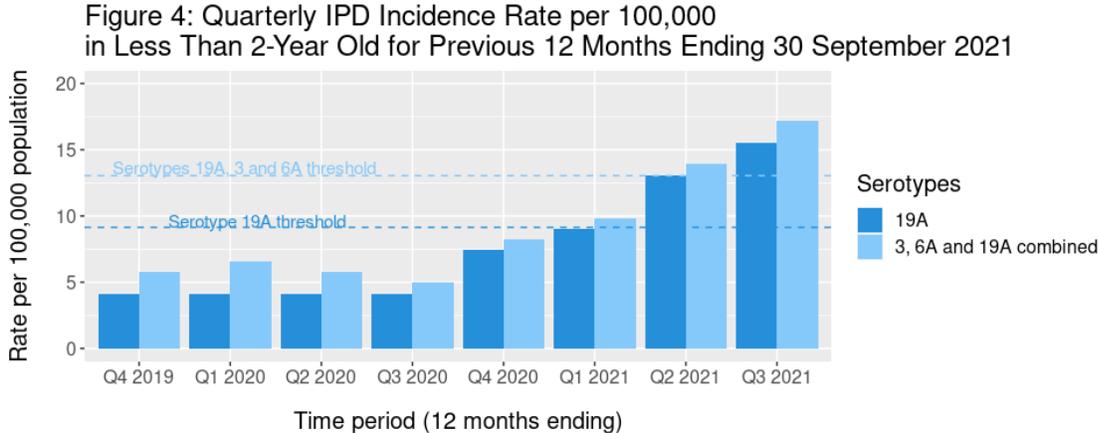
The threshold for 19A has been established at 9.1 cases per 100,000 children < 2 years of age. The rates we report are based on cumulative cases over a 4-quarter time-period. For the 12 months ending in December 2019 (Q4 2019), the rate of 19A was 4.1 and remained steady until the rate increased to 7.4 for the 12 months ending in December 2020 (Q4 2020) (Figure 4 and Table 1).

In the 12 months ending in June 2021 (Q2 2021), the rate for 19A cases exceeded the threshold for the first time, with a rate of 13.1 cases per 100,000.

And in the 12 months ending in September 2021 (Q3 2021) the rate of 19A cases has continued to increase, now at 15.5 cases per 100,000.

The rate for the combined serotypes of interest (3, 6A, and 19A) also steadily increased in the last four threshold analyses, and has also exceeded the threshold, with a rate of 17.2 per 100,000, though these increases are largely explained by the increase in 19A (19A represents more than 90% of cases of the combined serotypes over the last 12 months). An investigation into the increase in cases due to serotype 19A is ongoing.

**Figure 4: Quarterly IPD incidence rate per 100,000 in less than 2-year old for previous 12 months ending 30 September 2021**



**Table 1: Threshold Table of Quarterly IPD Incidence Rate per 100,000**

Serotypes	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021
3, 6A and 19A combined	5.8	6.6	5.8	5	8.2	9.8	13.91	17.18
19A	4.1	4.1	4.1	4.1	7.4	9	13.1	15.54

**Vaccine Preventable Incident Cases**

The number of cases with PCV10 preventable serotypes has steadily increased in 2021 (Table 2). Through Q3, the number of IPD incident cases (n=125) is now higher than 2019 and 2020 at year’s end. The proportion of all IPD cases that are 19A has steadily increased since 2017. In 2020, 21.1% of all IPD cases (with known serotypes) were 19A. Through Q3 2021, 31.8% of IPD cases are 19A.

The proportion of all vaccine preventable cases that are 19A has also increased since 2017. In 2017, 44.8% of all vaccine preventable cases (PCV10 serotypes) were 19A. Through Q3 2021, the proportion has nearly doubled to 84.8% of all vaccine preventable cases.

Among children under 5 years of age, the number of IPD cases that are vaccine preventable has increased steadily since 2018. Through Q3 2021, the number of vaccine preventable cases among children under 5 (n=27) is nearly as much as 2019 and 2020 combined (n=29). Further, since 2018, more than 95% of all vaccine preventable cases in children under 5 have been 19A (58/61).

**Table 2: Distribution of Vaccine Preventable Serotypes (2017-2021)**

Year (No. IPD cases)	No. with Vaccine Preventable Serotypes (PCV10)	No. 19A Cases (% of all IPD Cases)	No. 19A Cases (% of all vaccine preventable cases)	No. with Vaccine Preventable Serotypes (PCV10) for Children Under 5 Years of Age	No. 19A Cases (% of all vaccine preventable cases in children under 5 years of age)
2017 (n=482)	134	60(12.4%)	60(44.8%)	7	4(57.1%)
2018 (n=523)	127	75(14.3%)	75(59.1%)	5	4(80%)
2019 (n=461)	103	65(14.1%)	65(63.1%)	11	10(90.9%)
2020 (n=336)	89	71(21.1%)	71(79.8%)	18	18(100%)
2021 (n=333)	125	106(31.8%)	106(84.8%)	27	26(96.3%)

### Immunisation Status

Of all PCV eligible children born after January 1, 2008, 68 children diagnosed with IPD in 2021 through Q3, of whom 64 had NIR data available and 4 were assumed to be unvaccinated. Of these 64 children, 45.3% (n=29) were serotype 19A, 4.7% (n=3) were serotype 3, and 50.0% (n=32) were non-PCV serotypes or unknown (Table 3). There were 3 IPD cases that were serotype 3, which is covered by PCV13. One child had 2 doses of PCV10, one had 3 doses of PCV10, and one had 2 doses of PCV13. Of vaccine preventable serotypes (PCV10 serotypes), all 29 cases were serotype 19A. Of these 29, 1 had 4 doses of PCV7, 7 had 2 doses of PCV10, 4 had 3 doses of PCV10, and 10 had 4 doses of PCV10. Additionally, 2 had 4 doses of PCV13. An additional 6 children who were diagnosed with 19A were given a combination of PCVs. One child received both PCV7 and PCV10; one child received both PCV7 and PCV13; lastly, 4 children received both PCV10 and PCV13.

**Table 3: Immunisation Status (2021 through Quarter 3)**

Vaccine Type (doses)	PCV7 Serotypes							PCV10 Serotypes				PCV13 Serotypes		Non-PCV Serotypes or Unknown (n=32)	Number of People
	4 (n=0)	6B (n=0)	9V (n=0)	14 (n=0)	18C (n=0)	19F (n=0)	23F (n=0)	1 (n=0)	5 (n=0)	7F (n=0)	19A (n=29)	3 (n=3)	6A (n=0)		
PCV7															
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
PCV10															
1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3
2	0	0	0	0	0	0	0	0	0	0	7	1	0	8	16
3	0	0	0	0	0	0	0	0	0	0	4	0	0	1	5
4	0	0	0	0	0	0	0	0	0	0	10	1	0	9	20
PCV13															
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2
4	0	0	0	0	0	0	0	0	0	0	2	0	0	2	4
Multiple PCVs															
PCV7/PCV10	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
PCV7/PCV13	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
PCV10/PCV13	0	0	0	0	0	0	0	0	0	0	4	0	0	4	8
	0	0	0	0	0	0	0	0	0	0	29	3	0	32	64