

Invasive Pneumococcal Disease Quarterly Report January–March 2022

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 4 April 2022. 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.

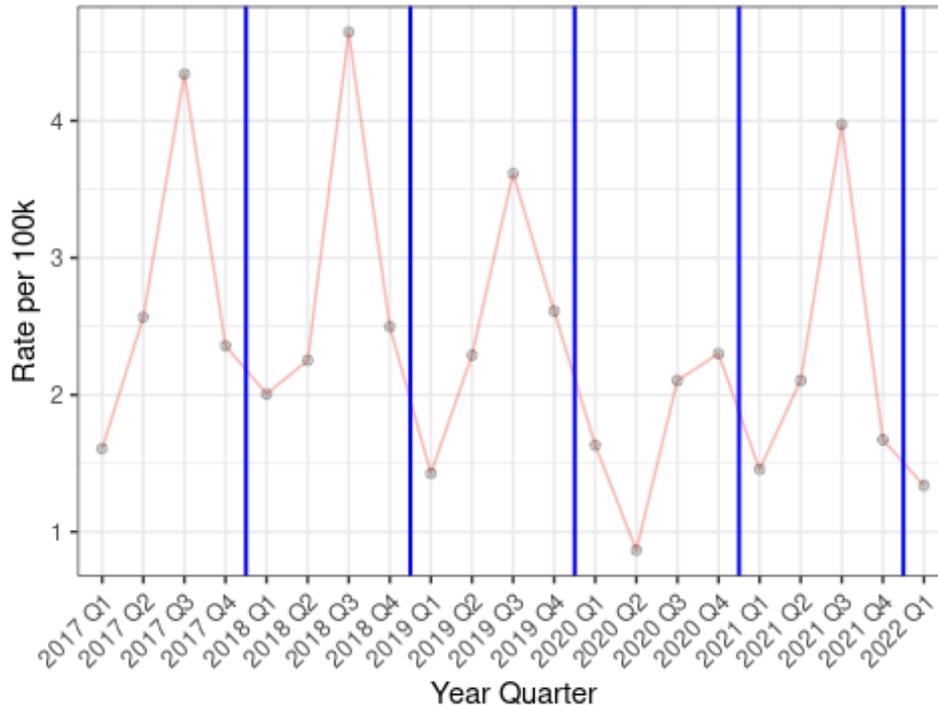
Note: a threshold breach does not confirm that the change in vaccination type is the explanation, but it indicates the need to investigate further. Further investigation will look into case-specific factors, such as immunisation status, the presence of underlying health conditions or risk factors which 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 68 IPD cases notified January to March 2022 (Q1 2022), which is largely in line with the number of notified cases in Q1 2019, Q1 2020, and Q1 2021 (Figure 1).

Figure 1: Quarterly IPD Rates (2017-2022)



Threshold Analyses (12 Months Ending March 2022)

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 March 2020 (Q1 2020), the rate of 19A was 4.1 and remained steady until the rate increased to 7.5 for the 12 months ending in December 2020 (Q4 2020) (Figure 2 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 13.3 cases per 100,000.

And in the 12 months ending in September 2021 (Q3 2021) the rate of 19A cases continued to increase, reaching 16.6 cases per 100,000.

In the 12 months ending in March 2022 (Q1 2022) the rate of 19A cases has plateaued at 15.0 cases per 100,000, still substantially above the threshold.

The rate for the combined serotypes of interest (3, 6A, and 19A) also steadily increased in the previous four threshold analyses, and also exceeded the threshold, with a rate of 18.3 per 100,000 in the 12 months ending in September 2021, 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). The rate for the combined serotypes of interest decreased in the 12 months ending in December 2021 to 15.8 cases per 100,000, before increasing again to 17.4 in the 12 months ending in March 2022. An investigation into the increase in cases due to serotype 19A is ongoing.

Figure 2: Quarterly IPD Incidence Rate per 100,000 in Less Than 2-Year Olds for Previous 12 Months Ending 31 March 2022

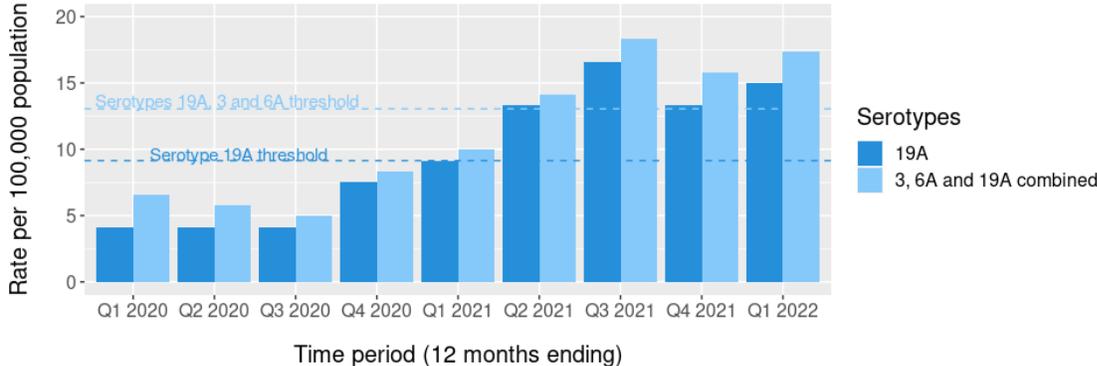


Table 1: Threshold Table of Quarterly IPD Incidence Rate per 100,000

Serotypes	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022
3, 6A and 19A combined	6.6	5.8	5	8.3	10	14.1	18.3	15.8	17.4
19A	4.1	4.1	4.1	7.5	9.1	13.3	16.6	13.3	15.0

Vaccine Preventable Incident Cases

The number of cases with PCV13 preventable serotypes among children under 5 has steadily increased since 2018 (Table 2). The proportion of PCV13-specific cases that are 19A among all ages has steadily increased since 2017. In 2019, 49.2% of all PCV13 cases were 19A, which increased to 75.0% in 2021. In 2022 through Q1, 65.2% of PCV13 cases are 19A.

Among children under 5 years of age, the number of IPD cases that are PCV10-vaccine preventable has remained low since 2017. However, the proportion of PCV13-vaccine preventable cases that are 19A has increased since 2017. In 2017, 36.4% of all vaccine preventable cases (PCV13 specific serotypes) were 19A. In 2021, the proportion reached 89% of all vaccine preventable cases (PCV13 specific serotypes). Through Q1 2022, 5 of 6 PCV13 serotype cases in children under 5 have been 19A. Since 2019, nearly 90% of all PCV13-vaccine preventable cases in children under 5 have been serotype 19A (65/75).

Table 2: Distribution of Vaccine Preventable Serotypes (2017-2022)

Year	No. IPD cases	No. IPD cases with known serotypes	No. with Vaccine Preventable Serotypes (PCV10)	No. with PCV13 Serotypes	No. 19A Cases (% of PCV13 cases)	No. IPD cases in Children Under 5 Years of Age ¹	No. with Vaccine Preventable Serotypes (PCV10) for Children Under 5 Years of Age	No. with PCV13 Serotypes for Children Under 5 Years of Age	No. 19A Cases (% of cases with PCV13 serotypes in children under 5 years of age)
2017	521	482	74	169	60(35.5%)	45	3	11	4(36.4%)
2018	557	523	52	163	75(46%)	46	1	7	4(57.1%)
2019	495	461	38	132	65(49.2%)	45	1	13	10(76.9%)
2020	351	336	18	115	71(61.7%)	37	0	20	18(90%)
2021	468	449	25	184	138(75%)	66	1	36	32(88.9%)
2022	268	58	4	23	15(65.2%)	9	0	6	5(83.3%)

1. Includes cases with unknown serotype

Immunisation Status

Of all PCV eligible children born after January 1, 2008, 10 children diagnosed with IPD in 2022 through Q1. Of these 10 children, 9 had NIR data available and 1 had no NIR data and was assumed to be unvaccinated. Of these 10 children, 50.0% (n=5) were serotype 19A, 10.0% (n=1) was serotype 3, and 40.0% (n=4) were non-PCV serotypes or unknown (Table 3). There was one IPD case that was serotype 3, which is covered by PCV13. This child had 3 doses of PCV10. The other observed vaccine preventable serotype was 19A (also covered by PCV13) and was responsible for 5 cases. Of these 5, 2 had 2 doses of PCV10, 1 had 3 doses of PCV10, 1 had 4 doses of PCV10, and 1 was unvaccinated.

Table 3: Immunisation Status (2022 through Quarter 1)

Vaccine Type (doses)	PCV7 Serotypes							PCV10 Serotypes			PCV13 Serotypes			Non-PCV Serotypes or UNK	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=5	3 n=1	6A n=0		
PCV7															
1															
2															
3															
4														1	1
PCV10															
1															
2											2			1	3
3											1	1		1	3
4											1			1	2
PCV13															
1															
2															
3															
4															
Unvaccinated											1				1
Total											5	1		4	10

Note: blank cells represent 0 observations.

The year-to-date cumulative totals for all serotypes by year are shown in Table 4. Importantly, these data are sensitive to seasonal variation and the peak season for IPD is June-August. Additionally, serotype data are often delayed, therefore the most recent IPD isolates will likely have a much higher proportion of missing serotype information. Despite missing serotype data for recent notifications, serotype 19A is the most commonly reported vaccine (PCV13) preventable serotype year-to-date each year 2020-2022. In 2021, $n=19$ 19A cases were reported through March and in 2022 $n=15$ 19A cases were reported through March (an additional $n=10$ have an unknown serotypes).

Table 4: Year-To-Date Cumulative Totals by Year and Serotype

	2019	2020	2021	2022
	February Year-To-Date Cumulative Totals			
PCV10	8	5	2	4
1				
4		2		
5				
6B				1
7F	5	1	2	2
9V	1			
14				
18C				
19F	1	2		1
23F	1			
PCV13	11	20	22	19
3	5	8	3	4
6A				
19A	6	12	19	15
Other	49	56	46	35
Unknown	3	2	5	10
Total	71	83	75	68

The year-to-date 19A totals for age groups by year are shown in Table 5. In 2021, 2 of the 19 19A cases reported through March was < 2 years old and in 2022 4 of the 15 19A cases reported through March were < 2 years old.

Table 5: Year-To-Date 19A Cumulative Totals by Year and Age Group

	2019	2020	2021	2022
Age group (years)	February Year-To-Date Cumulative Totals			
<2			2	4
2-4	1	1	3	1
5 or older	5	11	14	10
Total 19A	6	12	19	15

The year-to-date 19A totals for ethnicity groups by year are shown in Table 6. In 2021, 6 of the 19 19A cases reported through March were European/Other, 6 were Māori, 5 were Pacific peoples, and 2 were Asian. In 2022, 7 of the 15 19A cases reported through March were Māori and 7 were European/Other; one's ethnicity is still unknown.

Table 6: Year-To-Date 19A Cumulative Totals by Year and Ethnicity

	2019	2020	2021	2022
Ethnicity	February Year-To-Date Cumulative Totals			
European/Oth	4	4	6	7
Māori	1	4	6	7
Pacific peoples	1	3	5	
Asian		1	2	
Unknown				1
Total 19A	6	12	19	15

The year-to-date cumulative totals for all serotypes by year and DHB are in Table 7. The Northern Region has consistently had the highest number of IPD cases through March ($n=29$ in 2022). There are very few cases of IPD reported in children through March historically, making it difficult to interpret any geographical or temporal trends.

The year-to-date cumulative 19A cases by year and DHB are in Table 8. There are very few cases of 19A reported through March historically, making it difficult to interpret any geographical or temporal trends. Additionally, there are very few cases of IPD reported in children in March historically, making it difficult to interpret any geographical or temporal trends.

Table 7: Total IPD Cases by Age Group (All Ages and <5) by DHB and Region (through March YTD 2019-22)

District Health Board	2019		2020		2021		2022	
	<5	All ages	<5	All ages	<5	All ages	<5	All ages
Northland	1	5		8		6		6
Waitemata		8		11	3	10	1	5
Auckland	3	8	1	7		1		1
Counties Manukau	1	12	1	16		8	2	17
Northern region	5	33	2	42	3	25	3	29
Waikato	1	4	1	15	1	9		1
Lakes		1		2		2		1
Bay of Plenty	1	7		1		6		1
Tairāwhiti						2		1
Taranaki		2		1		2		2
Midland region	2	14	1	19	1	21	0	6
Hawke's Bay		3		2	1	4	2	6
Whanganui				2		1		2
MidCentral		1		3		1		1
Hutt Valley		2	1	1	2	2		4
Capital & Coast		4			3	7	1	4
Wairarapa		1		1				2
Nelson Marlborough		3			1	1	1	1
Central region	0	14	1	9	7	16	4	20
West Coast		1						
Canterbury		8	1	7	2	9	1	6
South Canterbury				3				1
Southern		1		3	1	4	1	6
Southern region	0	10	1	13	3	13	2	13
Total	7	71	5	83	14	75	9	68

Table 8: 19A Cases by Age Group (All Ages and <5) by DHB and Region (Through March YTD 2019-22)

District Health Board	2019		2020		2021		2022	
	<5	All ages	<5	All ages	<5	All ages	<5	All ages
Northland		1		2		1		2
Waitemata		1		1	1	2	1	1
Auckland		1						
Counties Manukau			1	5		3	1	3
Northern region	0	3	1	8	1	6	2	6
Waikato				2		4		
Lakes						1		
Bay of Plenty	1	1				1		
Tairāwhiti						1		
Taranaki								
Midland region	1	1	0	2	0	7	0	0
Hawke's Bay								
Whanganui						1		
MidCentral								
Hutt Valley					1	1		
Capital & Coast		1				1	1	2
Wairarapa								2
Nelson Marlborough								
Central region	0	1	0	0	1	3	1	4
West Coast								
Canterbury				2	2	2	1	3
South Canterbury								
Southern		1			1	1	1	2
Southern region	0	1	0	2	3	3	2	5
Total	1	6	1	12	5	19	5	15