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Invasive Pneumococcal Disease Quarterly Report

October–December 2017

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by
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Introduction

Since 17 October 2008, invasive pneumococcal disease (IPD) has been notifiable to the local Medical Officer of Health under the Health Act 1956. On 1 June 2008, pneumococcal conjugate vaccine (PCV) was added to the New Zealand childhood immunisation schedule. Initially the 7-valent conjugate vaccine (PCV7), Prevenar®, was used. In July 2011, Prevenar® was replaced on the schedule with the 10-valent conjugate vaccine (PCV10), Synflorix®. In July 2014, Synflorix® was replaced by the 13-valent conjugate vaccine (PCV13), Prevenar13®. In July 2017, Prevenar13® was replaced by Synflorix®.

PCV10 includes the seven serotypes in PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F) as well as serotypes 1, 5 and 7F, and cross-reactivity to serotype 19A. PCV13 includes the 10 serotypes in PCV10 as well as serotypes 3, 6A and 19A. The recommended schedule is four doses, given at 6 weeks, 3 months, 5 months and 15 months of age.

These quarterly 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.

Methods

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 13 March 2018. 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.

Denominator data used to determine all disease rates in this report was derived from the 2016 and 2017 mid-year population estimates published by Statistics New Zealand unless otherwise specified. Rates have not been calculated where there are fewer than five notified cases in any category.

The Fisher's exact test was used to determine statistical significance. Results are considered statistically significant when the *P* value is ≤0.05.

Streptococcus pneumoniae isolates are serotyped at ESR by the capsular antigen reaction (Neufeld test) using the Danish system of nomenclature and sera obtained from the Statens Serum Institut. Methods have not been established at ESR to identify the strain type when only pneumococcal DNA, rather than an isolate, is available. Therefore, the serotype can only be determined for culture-positive IPD cases. Serotype data for invasive isolates of *S. pneumoniae* was matched with the relevant IPD case notification.

Case definition

A case of invasive pneumococcal disease is defined as:

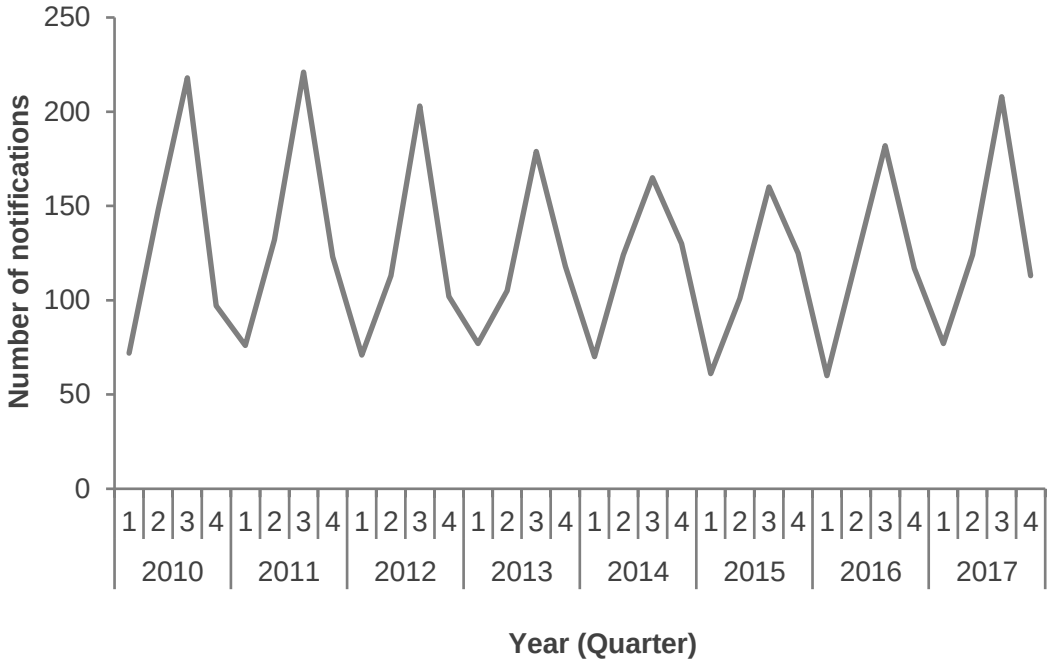
- the isolation of *S. pneumoniae* from CSF, blood or other normally sterile site; or
- the detection by nucleic acid amplification test of pneumococcal DNA in CSF, blood or other normally sterile site; or
- a positive newer-generation *S. pneumoniae* antigen test on CSF or pleural fluid.[1]

[1] A positive *S. pneumoniae* antigen test on pleural fluid was added to the case definition in mid-September 2016.

Results

There were 113 IPD cases notified in the October–December 2017 quarter, compared with 117 cases in the same quarter in 2016. IPD displays a distinct seasonal pattern with a winter peak and summer trough (Figure 1). The notification rate for the latest 12-month period ending December 2017 (10.9 per 100,000 population, 522 cases) was higher than the rate for the previous 12-month period ending December 2016 (10.2 per 100,000, 480 cases).

Figure 1. Number of cases of invasive pneumococcal disease by quarter reported, January 2010–December 2017



The distribution of IPD cases and rates by age group is presented in Table 1. During the latest 12-month period, the highest rate was in the ≥65 years age group (31.1 per 100,000 population, 225 cases). Comparing the latest 12-month period with the previous 12-month period, there were no significant changes in the age-specific rates.

Table 1. Number of cases and rates of invasive pneumococcal disease by age group

Age group	Oct-Dec 2017	12 months ending Dec 2017		12 months ending Dec 2016	
	Cases	Cases	Rate[a]	Cases	Rate[a]
<2 years	6	23	19.0	22	18.4
2–4 years	4	22	11.9	24	12.9
5–64 years	59	252	6.7	241	6.5
≥65 years	44	225	31.1	193	27.6
Total	**113**	**522**	**10.9**	**480**	**10.2**

[a] Rate is expressed as cases per 100,000 population.

The distribution of IPD cases and rates by region is presented in Table 2. The highest rates for the latest 12-month period were in the Midland and Central regions (14.1 per 100,000 population, 129 cases, and 11.5 per 100,000 population, 122 cases, respectively). Comparing the latest 12-month period with the previous 12-month period, there was a significant decrease in the rate for the Northern region and a significant increase in the rate for the Central region. There were no significant changes for individual DHBs.

Table 2. Number of cases and rates of invasive pneumococcal disease by region

Region	Oct-Dec 2017	12 months ending Dec 2017		12 months ending Dec 2016	
	Cases	Cases	Rate[a]	Cases	Rate[a]
Northern[b]	37	190	10.3	228	12.6
Midland[c]	26	129	14.1	98	10.9
Central[d]	35	122	11.5	74	7.1
Southern[e]	15	81	8.4	80	8.4
Total	**113**	**522**	**10.9**	**480**	**10.2**

[a] Rate is expressed as cases per 100,000 population.

[b] Includes Northland, Waitemata, Auckland and Counties Manukau DHBs.

[c] Includes Waikato, Lakes, Bay of Plenty, Tairawhiti and Taranaki DHBs.

[d] Includes Hawke's Bay, Whanganui, MidCentral, Hutt Valley, Capital & Coast, Wairarapa and Nelson Marlborough DHBs.

[e] Includes West Coast, Canterbury, South Canterbury and Southern DHBs.

A culture was received at ESR for serotyping from 106 (93.8%) of the 113 cases notified in the October−December 2017 quarter. Table 3 shows the number of IPD cases due to each of the serotypes included in PCV7, PCV10 and PCV13, and due to non-PCV13 serotypes.

The number of IPD cases due to PCV13 serotypes decreased 11.1% between the last two 12-month periods (189 to 168 cases). In contrast, the number of IPD cases due to non-PCV13 serotypes increased 20.7% between the last two 12-month periods (266 to 321 cases). The increase in IPD due to non-PCV13 types occurred in the <2 years and ≥5 years age group (Table 3).

The three most prevalent serotypes during the last 12 months were 19A, 8 and 22F. However, between the last two 12-month periods, total cases of IPD due to type 19A decreased by 23.1%, whereas cases of the non-PCV13 type 8 increased by 69.0% (Table 3). Total cases of the non-PCV13 type 22F remained relatively stable (35 cases in the current 12-month period compared with 39 cases in the previous 12-month period).

Table 3. Number of invasive pneumococcal disease cases by serotype and age group

Serotypes	Age group											
	<2 years			2–4 years			≥5 years			Total		
	Q4 2017[a]	2017[b]	2016[c]	Q4 2017[a]	2017[b]	2016[c]	Q4 2017[a]	2017[b]	2016[c]	Q4 2017[a]	2017[b]	2016[c]
4	0	1	0	0	0	1	4	18	20	4	19	21
6B	0	0	0	0	0	0	0	1	1	0	1	1
9V	0	0	0	0	1	0	0	3	2	0	4	2
14	0	0	0	0	1	0	0	1	7	0	2	7
18C	0	0	0	0	0	0	0	1	2	0	1	2
19F	0	0	0	0	0	0	2	14	12	2	14	12
23F	0	0	0	0	0	0	0	1	2	0	1	2
Total PCV7	**0**	**1**	**0**	**0**	**2**	**1**	**6**	**39**	**46**	**6**	**42**	**47**
1	0	0	0	0	0	0	2	2	1	2	2	1
5	0	0	0	0	0	0	0	0	2	0	0	2
7F	0	0	1	0	0	0	7	30	32	7	30	33
Total PCV10	**0**	**1**	**1**	**0**	**2**	**1**	**15**	**71**	**81**	**15**	**74**	**83**
3	0	3	2	0	1	2	9	28	23	9	32	27
6A	0	0	0	0	0	0	1	2	1	1	2	1
19A[d]	0	0	6	1	4	9	6	56	63	7	60	78
Total PCV13	**0**	**4**	**9**	**1**	**7**	**12**	**31**	**157**	**168**	**32**	**168**	**189**
6C	0	0	0	0	1	1	2	12	18	2	13	19
8	0	1	0	0	0	0	17	48	29	17	49	29
9N	0	0	2	0	0	0	2	12	12	2	12	14
10A	0	2	0	0	0	0	2	9	9	2	11	9
11A	0	0	0	0	0	0	4	20	8	4	20	8
12F	1	3	0	0	0	0	4	19	6	5	22	6
15A	0	0	0	1	2	1	3	18	13	4	20	14
15B	0	1	2	0	0	1	2	14	4	2	15	7
15C	0	1	0	0	1	1	1	3	1	1	5	2
16F	0	0	0	0	0	0	3	15	11	3	15	11
17F	0	1	0	0	0	0	0	4	9	0	5	9
22F	0	1	1	2	3	2	7	31	36	9	35	39
23A	0	0	0	0	1	0	2	11	9	2	12	9
23B	0	1	0	0	0	0	5	16	18	5	17	18
31	0	0	0	0	0	0	1	7	7	1	7	7
33F	1	1	3	0	1	1	3	14	19	4	16	23
35B	0	0	0	0	0	1	2	5	8	2	5	9
35F	0	0	0	0	0	0	0	5	2	0	5	2
38	2	2	0	0	0	1	2	12	5	4	14	6
Other types[e]	1	2	2	0	0	0	4	21	23	5	23	25
Total non-PCV13	**5**	**16**	**10**	**3**	**9**	**9**	**66**	**296**	**247**	**74**	**321**	**266**

[a] Cases reported in the fourth quarter of 2017 (October-December 2017).

[b] Cases reported in the 12 months ending 31 December 2017.

[c] Cases reported in the 12 months ending 31 December 2016.

[d] The indications for PCV10 include cross-protection against 19A disease.

[e] Any of these other types accounted for <5 IPD cases during the 12 months ending 31 December 2017.

Table 4 shows the immunisation status for cases notified in the October−December 2017 quarter who were age-eligible for PCV (ie, cases born after 1 January 2008 and aged ≥6 weeks). Immunisation status was based on information recorded in the National Immunisation Register. Of the 13 cases that were age-eligible for PCV, one case was due to serotype 19A, nine cases were due to non-PCV13 serotypes, and serotype information was not available for three cases. The serotype 19A case was recorded as having 4 doses of PCV10 and is considered a vaccine failure.

Ethnicity was recorded for 109 (96.5%) of the 113 IPD cases notified in the October−December 2017 quarter (Table 5). The age-standardised rates of IPD were highest for the Pacific peoples (47.4 per 100,000 population, 18 cases) and Māori (26.7 per 100,000, 29 cases) ethnic groups. The rates for these two ethnic groups were, respectively, 7.4 and 4.2 times higher than the rate for the European or Other ethnic group (6.4 per 100,000, 55 cases) (Table 5).

In the October−December 2017 quarter, 105 (92.9%) of the 113 IPD cases had a residential address recorded that could be assigned a 2013 New Zealand Deprivation Index (NZDep13) score (Table 6). The most deprived areas (NZDep13 quintile 5) had the highest rate of IPD (19.2 per 100,000 population, 42 cases), 8.8 times the rate in the least deprived areas (2.2 per 100,000, 5 cases). Rates of IPD by deprivation index could only be calculated for all ages combined because population data by NZDep13 quintile and age groups was not available.

Table 4. Immunisation status of the invasive pneumococcal disease cases notified in the October - December 2017 quarter and who were eligible for PCV

Number of doses received[a]	Cases due to PCV7 serotypes: 4, 6B, 9V, 14, 18C, 19F or 23F[b]	Cases due to additional PCV10 serotypes: 1, 5, 7F[b]	Cases due to additional PCV13 serotypes: 3, 6A, 19A[b]	Cases due to non-PCV13 serotypes[b]	Total[b,c]
	Number	Number	Number	Number	Number
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	1	1
3	0	0	0	1	2
4	0	0	1[d]	7	10
Total	**0**	**0**	**1**	**9**	**13**

[a] Number of doses received prior to 14 days before onset of IPD. Onset of IPD was determined using the earliest episode date available from onset of illness date, hospitalised date or date reported to the public health unit.

[b] Only IPD cases eligible for PCV as part of the childhood immunisation schedule (ie, cases born after 1 January 2008 and aged ≥6 weeks) are presented.

[c] The total number of cases includes three cases where serotype information was not available.

[d] Case due to serotype 19A and is recorded as having received 4 doses of PCV10.

Table 5. Number of cases, and age-specific and age-standardised rate per 100,000 population of invasive pneumococcal disease by ethnic group and age group, October–December 2017 quarter

Age group (years)	Māori		Pacific peoples		Asian		MELAA[a]		European or Other	
	Cases	Rate[b]	Cases	Rate[b]	Cases	Rate[b]	Cases	Rate[b]	Cases	Rate[b]
<2	2	-	1	-	0	-	0	-	3	-
2-4	0	-	1	-	1	-	0	-	2	-
5-64	18	12.4	8	13.2	4	-	1	-	24	4.1
≥65	9	92.1	8	192.6	1	-	0	-	26	17.1
Total cases and crude rate for all ages[c]	**29**	**16.6**	**18**	**25.0**	**6**	**4.5**	**1**	**-**	**55**	**7.1**
Age-standardised rate[d]		**26.7**		**47.4**		**5.1**		**-**		**6.4**

[a] Middle Eastern/Latin American/African.

[b] Annualised rate per 100,000 population.

[c] Ethnicity was recorded for 109 (96.5%) of cases in the October-December 2017 quarter.

[d] The age-standardised rates are direct-standardised to the age distribution of the total New Zealand population.

Note: Denominator data used to determine disease rates for ethnic groups is based on the proportion of people in each ethnic group from the usually resident 2013 census population applied to the 2017 mid-year population estimates from Statistics New Zealand. Ethnicity is prioritised in the following order: Māori, Pacific peoples, Asian, MELAA and European or Other ethnicity (including New Zealander). Where there were fewer than five cases in any category, a rate has not been calculated.

Table 6. Number and percentage of invasive pneumococcal disease cases by quintiles of the 2013 New Zealand deprivation index and age group, October–December 2017 quarter

NZDep13 quintile[a]	<2 years		2-4 years		5-64 years		≥65 years		Total		
	Cases	%[b]	Cases	%[b]	Cases	%[b]	Cases	%[b]	Cases	%[b]	Rate[c]
1	0	0.0	0	0.0	3	5.4	2	5.0	5	4.8	2.2
2	0	0.0	1	25.0	9	16.1	3	7.5	13	12.4	5.8
3	1	20.0	0	0.0	8	14.3	8	20.0	17	16.2	7.8
4	2	40.0	1	25.0	11	19.6	14	35.0	28	26.7	12.9
5	2	40.0	2	50.0	25	44.6	13	32.5	42	40.0	19.2
Total[d]	**5**		**4**		**56**		**40**		**105**		

[a] Quintile of the 2013 New Zealand Deprivation Index (1 = least deprived and 5 = most deprived).

[b] Percentage of cases within the age group in the quintile.

[c] Annualised rate per 100, 000 population, based on the 2013 census data from Statistics New Zealand.

[d] Accurate New Zealand Deprivation Index (NZDep13) data was available for 105 (92.9%) cases notified in the October-December 2017 quarter.