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# Invasive Pneumococcal Disease Quarterly Report

## April – June 2018

Prepared as part of a Ministry of Health contract for scientific services

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 12 July 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 (NIR).

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:

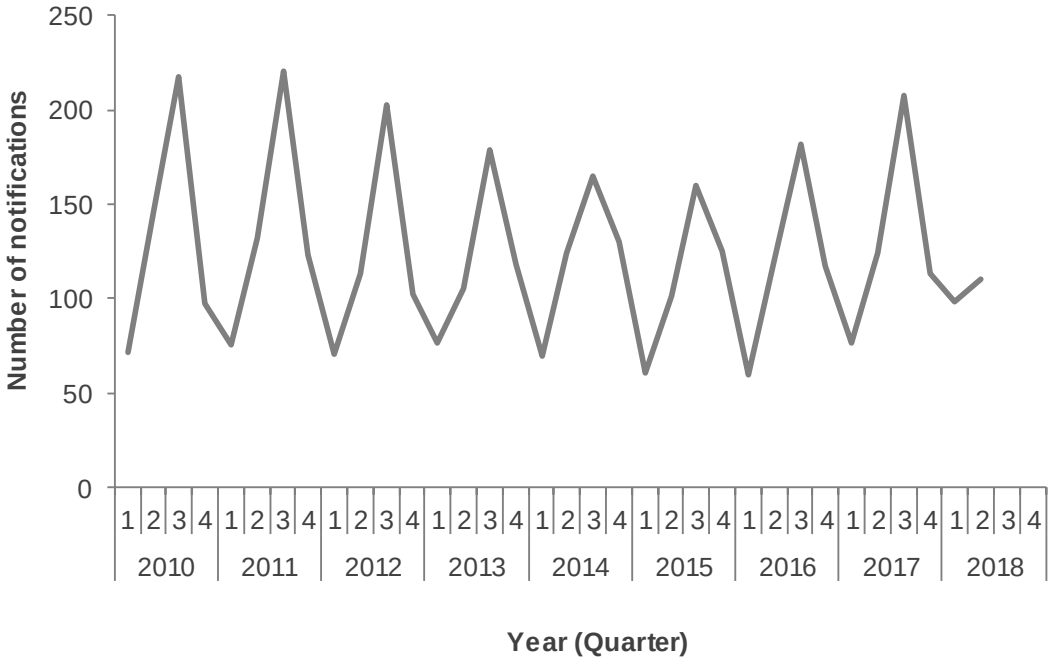
- the isolation of *S. pneumoniae* from CSF, blood or other normally sterile site; or
- the detection by nucleic acid amplification test of pneumococcal DNA in CSF, blood or other normally sterile site; or
- a positive newer-generation *S. pneumoniae* antigen test on CSF or pleural fluid.[1]

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

## Results

There were 110 IPD cases notified in the April–June 2018 quarter, compared with 124 cases in the same quarter in 2017. 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 June 2018 (11.0 per 100,000 population, 529 cases) was similar to the rate for the previous 12-month period ending June 2017 (10.7 per 100,000, 500 cases).

**Figure 1. Number of cases of invasive pneumococcal disease by quarter reported, January 2010–June 2018**




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 (29.9 per 100,000 population, 216 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 | Apr-Jun 2018 | 12 months ending Jun 2018 | | 12 months ending Jun 2017 | |
|---|---|---|---|---|---|
| | Cases | Cases | Rate[a] | Cases | Rate[a] |
| <2 years | 5 | 27 | 22.3 | 25 | 20.9 |
| 2–4 years | 2 | 21 | 11.4 | 21 | 11.3 |
| 5–64 years | 65 | 265 | 7.0 | 239 | 6.5 |
| ≥65 years | 38 | 216 | 29.9 | 215 | 30.8 |
| **Total** | **110** | **529** | **11.0** | **500** | **10.7** |

[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 rate for the latest 12-month period was in the Midland region (13.1 per 100,000 population, 120 cases). Comparing the latest 12-month period with the previous 12-month period, there were no significant changes in the rates by regions but there was a significant increase in Taranaki District Health Board (5 to 17 cases).

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

| Region | Apr-Jun 2018 | 12 months ending Jun 2018 | | 12 months ending Jun 2017 | |
|---|---|---|---|---|---|
| | Cases | Cases | Rate[a] | Cases | Rate[a] |
| Northern[b] | 46 | 202 | 10.9 | 219 | 12.1 |
| Midland[c] | 25 | 120 | 13.1 | 113 | 12.6 |
| Central[d] | 24 | 118 | 11.1 | 93 | 8.9 |
| Southern[e] | 15 | 89 | 9.2 | 75 | 7.9 |
| **Total** | **110** | **529** | **11.0** | **500** | **10.7** |

[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 96 (87.3%) of the 110 cases notified in the April−June 2018 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 8.3% between the last two 12-month periods (180 to 165 cases). In contrast, the number of IPD cases due to non-PCV13 serotypes increased 11.4% (289 to 322 cases). The increase in IPD due to non-PCV13 types occurred across all age groups (Table 3).

The six most prevalent serotypes during the last 12 months were 19A, 8, 3, 7F, 22F and 12F. Between the last two 12-month periods, cases of IPD due to type 19A decreased by 16.0% (75 to 63 cases) and 22F cases decreased by 22.0% (41 to 32 cases). However, there were notable increases in cases due to types 12F and 8: 181.8% (11 to 31 cases) and 40.0% (35 to 49 cases), respectively (Table 3).

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

| Serotypes | Age group | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | <2 years | | | 2–4 years | | | ≥5 years | | | Total | | |
| | Q2 2018[a] | 2018[b] | 2017[c] | Q2 2018[a] | 2018[b] | 2017[c] | Q2 2018[a] | 2018[b] | 2017[c] | Q2 2018[a] | 2018[b] | 2017[c] |
| 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 11 | 18 | 1 | 11 | 19 |
| 6B | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 2 |
| 9V | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 0 | 1 | 6 |
| 14 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 6 | 0 | 1 | 6 |
| 18C | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 |
| 19F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 10 | 0 | 11 | 10 |
| 23F | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 2 |
| **Total PCV7** | **0** | **0** | **1** | **0** | **1** | **1** | **2** | **26** | **46** | **2** | **27** | **48** |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 6 | 0 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 7F | 0 | 0 | 1 | 0 | 0 | 0 | 7 | 32 | 25 | 7 | 32 | 26 |
| **Total PCV10** | **0** | **1** | **2** | **0** | **1** | **1** | **9** | **63** | **72** | **9** | **65** | **75** |
| 3 | 0 | 0 | 4 | 0 | 0 | 3 | 10 | 34 | 22 | 10 | 34 | 29 |
| 6A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 3 | 1 |
| 19A[d] | 0 | 0 | 5 | 0 | 3 | 5 | 19 | 60 | 65 | 19 | 63 | 75 |
| **Total PCV13** | **0** | **1** | **11** | **0** | **4** | **9** | **38** | **160** | **160** | **38** | **165** | **180** |
| 6C | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 17 | 13 | 3 | 18 | 14 |
| 8 | 1 | 1 | 1 | 0 | 0 | 0 | 11 | 48 | 34 | 12 | 49 | 35 |
| 9N | 0 | 0 | 2 | 0 | 0 | 0 | 4 | 13 | 14 | 4 | 13 | 16 |
| 10A | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 13 | 10 | 2 | 17 | 10 |
| 11A | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 18 | 11 | 2 | 18 | 11 |
| 12F | 0 | 4 | 1 | 0 | 1 | 0 | 6 | 26 | 10 | 6 | 31 | 11 |
| 15A | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 17 | 13 | 1 | 19 | 14 |
| 15B | 1 | 1 | 2 | 0 | 0 | 1 | 3 | 11 | 8 | 4 | 12 | 11 |
| 16F | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 15 | 12 | 3 | 15 | 12 |
| 22F | 0 | 1 | 1 | 0 | 3 | 1 | 5 | 28 | 39 | 5 | 32 | 41 |
| 23A | 0 | 1 | 0 | 0 | 0 | 1 | 3 | 9 | 10 | 3 | 10 | 11 |
| 23B | 0 | 0 | 1 | 0 | 1 | 0 | 4 | 20 | 18 | 4 | 21 | 19 |
| 33F | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 13 | 17 | 2 | 16 | 19 |
| 38 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 9 | 8 | 0 | 13 | 8 |
| Other types[e] | 1 | 3 | 2 | 1 | 1 | 2 | 5 | 34 | 53 | 7 | 38 | 57 |
| **Total non-PCV13** | **3** | **21** | **11** | **2** | **10** | **9** | **53** | **291** | **270** | **58** | **322** | **289** |

[a] Cases reported in the second quarter of 2018 (April-June 2018).

[b] Cases reported in the 12 months ending 30 June 2018.

[c] Cases reported in the 12 months ending 30 June 2017.

[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 30 June 2018.

Table 4 shows the immunisation status for cases notified in the April−June 2018 quarter who were age-eligible for PCV (i.e. cases born after 1 January 2008 and aged ≥6 weeks). Of the 14 cases that were age-eligible for PCV, one case did not have a record in the NIR. Of the remaining 13 cases, three were due to serotype 19A, eight were due to non-PCV13 serotypes, and serotype information was not available for two cases. Two of the serotype 19A cases were recorded as having had 4 doses of PCV10. The third 19A case was recorded as having received 3 doses of PCV7, and 1 dose each of PCV10, PCV13 and the 23-valent pneumococcal polysaccharide vaccine. However, only one of these three 19A cases (one of the cases who had received 4 doses of PCV10) was considered a vaccine failure as the other two cases were reported to be immune compromised.

**Table 4. Immunisation status of the invasive pneumococcal disease cases notified in the April−June 2018 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 | 3[d] | 6 | 10 |
| **Total** | **0** | **0** | **3** | **8** | **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 case notified 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 two cases for whom serotype information was not available.

[d] These three cases were all due to serotype 19A.

Note: Immunisation status is based on information recorded in the National Immunisation Register (NIR). There was no NIR record for one case who was eligible for PCV. This case is not included in the Table.