# Invasive Pneumococcal Disease
# Quarterly Report

## October−December 2014

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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®.

PCV10 covers the seven serotypes in PCV7 (4, 6B, 9V, 14, 18C, 19F and 23F) as well as serotypes 1, 5 and 7F. PCV13 covers 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 is based on the information recorded on EpiSurv, the national notifiable disease surveillance system, as at 3 February 2015. Any changes made to EpiSurv data by public health unit staff after this date will not be reflected in this report.

Denominator data used to determine all disease rates in this report was derived from the 2013 mid-year population estimates published by Statistics New Zealand. 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 $\leq 0.05$.

*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, 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

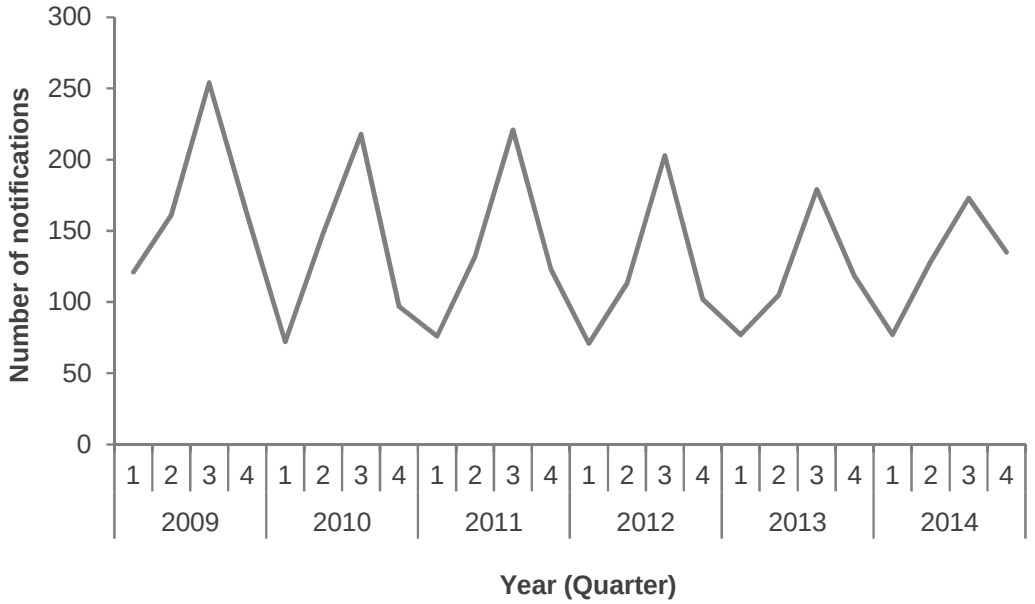
A case of invasive pneumococcal disease is defined as:

- 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 in individuals from whom samples were obtained after antibiotic treatment.

## Results

There were 135 IPD cases notified in the October−December 2014 quarter, compared with 118 cases in same quarter in 2013. 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 2014 (11.5 per 100 000 population, 513 cases) was greater than the rate for the previous 12-month period ending December 2013 (10.8 per 100 000, 479 cases).

**Figure 1. Number of cases of invasive pneumococcal disease by quarter reported, January 2009–December 2014**




The distribution of IPD cases and rates by age group is presented in Table 1. During the latest 12-month period the highest rates were in the ≥65 years (34.6 per 100 000 population, 220 cases) and <2 years (32.4 per 100 000, 39 cases) age groups. 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 2014 | 12 months ending Dec 2014 | | 12 months ending Dec 2013 | |
|---|---|---|---|---|---|
| | Cases | Cases | Rate[a] | Cases | Rate[a] |
| <2 years | 14 | 39 | 32.4 | 24 | 19.6 |
| 2–4 years | 8 | 25 | 13.3 | 16 | 8.5 |
| 5–64 years | 54 | 229 | 6.5 | 252 | 7.2 |
| ≥65 years | 59 | 220 | 34.6 | 187 | 30.6 |
| **Total** | **135** | **513** | **11.5** | **479** | **10.8** |

[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 (14.5 per 100 000 population, 123 cases). Comparing the latest 12-month period to the previous 12-month period, there were significant increases in the Northern region (169 to 211 cases) and in Auckland DHB (38 to 59 cases).

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

| Region | Oct–Dec 2014 | 12 months ending Dec 2014 | | 12 months ending Dec 2013 | |
|---|---|---|---|---|---|
| | Cases | Cases | Rate[a] | Cases | Rate[a] |
| Northern[b] | 62 | 211 | 12.4 | 169 | 10.0 |
| Midland[c] | 30 | 123 | 14.5 | 116 | 13.8 |
| Central[d] | 26 | 105 | 10.4 | 110 | 10.9 |
| Southern[e] | 17 | 74 | 8.2 | 84 | 9.4 |
| **Total** | **135** | **513** | **11.5** | **479** | **10.8** |

[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 and 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 126 (93%) of the 135 cases notified in the October–December 2014 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 all PCV10 serotypes combined decreased 30% between the last two 12-month periods (164 to 114 cases). During the last 12 months, there were only two cases of IPD due to a PVC10 type in the <2 years age group.

The three most prevalent serotypes during the last 12 months were 19A, 7F and 3 (Table 3). Cases due to serotypes 19A and 3 (both PCV13 types) increased during the last 12-month period. Notably the increase in cases of 19A disease occurred in the <2 years age group (7 to 13 cases) as well as the >5 years age group. A similar increase in cases of 19A disease in the <2 years age group was observed between 2011 and 2012.

The increases observed in cases of serotype 7F (a PCV10 type) since 2012, which have been mainly confined to the >5 years age group, appear to have arrested with a decrease in the number of cases in the latest 12-month period compared to the previous 12-month period (54 vs 69). This decrease in cases of serotype 7F IPD may indicate an indirect effect of infant PCV10 immunisation on type 7F disease in the older age groups is beginning to occur.

**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 2014[a] | 2014[b] | 2013[c] | Q4 2014[a] | 2014[b] | 2013[c] | Q4 2014[a] | 2014[b] | 2013[c] | Q4 2014[a] | 2014[b] | 2013[c] |
| 4 | 0 | 0 | 0 | 0 | 1 | 0 | 7 | 23 | 32 | 7 | 24 | 32 |
| 6B | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 7 | 1 | 2 | 7 |
| 9V | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 | 11 | 2 | 7 | 11 |
| 14 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 7 | 1 | 4 | 7 |
| 18C | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 8 | 16 | 2 | 9 | 16 |
| 19F | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 10 | 12 | 0 | 11 | 13 |
| 23F | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 6 | 1 | 2 | 6 |
| **Total PCV7** | **0** | **2** | **1** | **0** | **2** | **0** | **14** | **55** | **91** | **14** | **59** | **92** |
| 1 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 1 | 3 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7F | 0 | 0 | 1 | 1 | 1 | 0 | 8 | 53 | 68 | 9 | 54 | 69 |
| **Total PCV10** | **0** | **2** | **2** | **1** | **4** | **2** | **22** | **108** | **160** | **23** | **114** | **164** |
| 3 | 3 | 7 | 3 | 1 | 2 | 0 | 6 | 34 | 20 | 10 | 43 | 23 |
| 6A | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 1 | 3 |
| 19A | 6 | 13 | 7 | 0 | 5 | 5 | 10 | 71 | 64 | 16 | 89 | 76 |
| **Total PCV13** | **9** | **22** | **13** | **2** | **11** | **7** | **39** | **214** | **246** | **50** | **247** | **266** |
| 6C | 1 | 3 | 0 | 1 | 2 | 0 | 6 | 22 | 21 | 8 | 27 | 21 |
| 8 | 1 | 2 | 2 | 0 | 0 | 0 | 9 | 19 | 15 | 10 | 21 | 17 |
| 9N | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 15 | 12 | 2 | 17 | 12 |
| 10A | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 6 | 5 | 1 | 7 | 6 |
| 11A | 0 | 0 | 2 | 0 | 0 | 1 | 7 | 12 | 8 | 7 | 12 | 11 |
| 15B | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 6 | 7 | 2 | 7 | 8 |
| 16 non-typable | 0 | 1 | 0 | 0 | 1 | 0 | 5 | 13 | 7 | 5 | 15 | 7 |
| 17F | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 5 | 0 | 5 | 6 |
| 22F | 0 | 0 | 1 | 0 | 1 | 0 | 12 | 38 | 40 | 12 | 39 | 41 |
| 23A | 1 | 1 | 0 | 0 | 0 | 0 | 5 | 10 | 6 | 6 | 11 | 6 |
| 23B | 0 | 0 | 1 | 0 | 0 | 1 | 2 | 10 | 4 | 2 | 10 | 6 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 2 | 2 | 5 | 2 |
| 33F | 0 | 2 | 1 | 0 | 0 | 0 | 2 | 7 | 10 | 2 | 9 | 11 |
| 35 non-typable | 0 | 0 | 0 | 1 | 1 | 1 | 3 | 14 | 6 | 4 | 15 | 7 |
| Other types[d] | 0 | 1 | 1 | 2 | 2 | 1 | 11 | 20 | 23 | 13 | 23 | 25 |
| **Total non-PCV13** | **3** | **12** | **9** | **5** | **9** | **6** | **68** | **202** | **171** | **76** | **223** | **186** |

[a] Cases reported in the fourth quarter of 2014 (October−December 2014).

[b] Cases reported in the 12 months ending 31 December 2014.

[c] Cases reported in the 12 months ending 31 December 2013.

[d] Other serogroups/serotypes reported in the October−December 2014 quarter include 7C, 10 (not 10A), 12F, 13, 15C, 17 (not 17F), 20, 22A and 38. Each of these serogroups/serotypes accounted for <5 IPD cases during the 12 months ending 31 December 2014.