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## **Invasive Pneumococcal Disease Surveillance, 1 October to 31 December 2018**

Rachael Corvisy and the Enhanced Invasive Pneumococcal Disease Surveillance Working Group, for the Communicable Diseases Network Australia

# Communicable Diseases Intelligence

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# Invasive Pneumococcal Disease Surveillance, 1 October to 31 December 2018<sup>i</sup>

Rachael Corvisy and the Enhanced Invasive Pneumococcal Disease Surveillance Working Group,  
for the Communicable Diseases Network Australia

## Summary

The number of notified cases of invasive pneumococcal disease (IPD) in the fourth quarter of 2018 was lower than the previous quarter, but greater than the fourth quarter of 2017. Following the July 2011 replacement of the 7-valent pneumococcal conjugate vaccine (7vPCV) in the childhood immunisation program with the 13-valent pneumococcal conjugate vaccine (13vPCV), there was an initial relatively rapid decline in disease due to the additional six serotypes covered by the 13vPCV across all age groups; however, more recently this decline is no longer evident. Over this period the number of cases due to the eleven serotypes additionally covered by the 23-valent pneumococcal polysaccharide vaccine (23vPPV), and also those serotypes not covered by any available vaccine, has been increasing steadily across all age groups (Figure 1).

## Key points

IPD exhibits seasonal variations with incidence increasing over the winter months in temperate countries. In the fourth quarter of 2018, there were 452 cases of IPD reported to the National Notifiable Disease Surveillance System (NNDSS). Compared with the previous quarter (n=813), this represented a substantial decrease (44%) in the number of cases. However, compared with the number of cases reported in the same quarter in 2017 (n=423), there were 7% more cases this quarter (Table 1). In the fourth quarter of 2018, the most common pneumococcal serotype causing IPD continued to be serotype 3 (15%; 68/452), followed by 22F (10%; 44/452) and 19A (6%; 27/452) (Table 2).

Among non-Indigenous Australians this quarter, the number of notified cases continued to be highest in children aged less than 5 years and in older adult age groups, especially those aged 50 years and older (Table 3). Among Indigenous Australians, notifications were relatively evenly

distributed across age groups. The proportion of cases reported as Indigenous Australians this quarter (9%; 41/452) was slightly lower than the proportion in the previous quarter (12%; 101/813) and the fourth quarter of 2017 (14%; 61/423) (Table 1).

Children aged less than 5 years comprised 13% (60/452) of all cases reported in this quarter, which was similar to the third quarter in 2018 (14%; 114/813) and slightly lower than in the fourth quarter of 2017 (16%; 67/423). Serotype information was available for 46 (78%) of the cases aged less than 5 years this quarter. Just over half of these cases (56%; 26/46) had a serotype included in the 13vPCV, which was an increase on the previous quarter (48%; 37/77) and a slight increase compared to the fourth quarter of 2017 (51%; 23/45) (Figure 2). Of those cases aged less than 5 years this quarter for which serotype information was available, the most frequent serotypes were serotype 3 (22%; 10/46) and 19A (22%; 10/46), both of which are included in the 13vPCV. Of the 26 cases aged less than 5 years

<sup>i</sup> Based on data extracted from the National Notifiable Diseases Surveillance System (NNDSS) on 4 February 2019. Due to the dynamic nature of the NNDSS, data on this extract is subject to retrospective revision and may vary from data reported in published NNDSS reports and reports of notification data by states and territories.



with 13vPCV serotypes, 16 cases were fully vaccinated and considered to be 13vPCV failures. These 13vPCV failures were due to serotypes 19A (n=7), 3 (n=6), and 19F (n=3) (Table 4).

Among Indigenous Australians aged 50 years and over, there were 19 cases of IPD reported this quarter. The number of reported cases of IPD in this population group this quarter was almost halved from the previous quarter (n=36) but was similar to the number of cases reported in the fourth quarter of 2017 (n=21). Of those cases with a reported serotype (n=17), 13 (77%) were due to a serotype included in the 23vPPV (Figure 3). Whilst the proportion of cases with a reported serotype that were due to a serotype included in the 23vPPV is similar to the proportion reported last quarter (74%; 25/34), this proportion is much higher than that for the fourth quarter of 2017 (45%; 9/20). Amongst this population group, the most frequently reported serotypes this quarter were serotypes 3 (n=4) and 19F (n=2), both of which are included in the 23vPPV.

Among non-Indigenous Australians<sup>ii</sup> aged 65 years and over there were 166 cases of IPD reported this quarter. The number of notified cases of IPD in this population group was 47% lower than the number of cases reported in the previous quarter (n=310) and 11% higher than the number reported in the fourth quarter of 2017 (n=149). Of those cases with a reported serotype (n=157), 63% (99/157) were due to a serotype included in the 23vPPV (Figure 4). This was similar to the proportions in the previous quarter (64%; 185/290) and in the fourth quarter of 2017 (59%; 85/144). For this quarter, serotype 3 (n=23) was the most common serotype reported for this population group, followed by serotypes 22F (n=19), 31 (n=10) and 23A (n=10). Serotypes 3 and 22F are included in the 23vPPV.

During this quarter there were 26 deaths attributed to a variety of IPD serotypes. Sixteen (62%)

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ii Non-Indigenous Australians includes cases reported with an Indigenous status of non-Indigenous, not stated, blank or unknown.

of the cases had a serotype covered by currently available pneumococcal vaccines, eight were due to a non-vaccine serotype, one was reported as no isolate, and one was reported as being untyped. Three (12%) of the reported deaths this quarter were reported in Indigenous Australians. The median age of those cases reported to have died this quarter was 69 years (range 1 to 98 years).

## Notes

The data in this report are provisional and subject to change as laboratory results and additional case information become available. More detailed data analysis of IPD in Australia and surveillance methodology are described in the IPD annual report series published in *Communicable Diseases Intelligence*.

In Australia, pneumococcal vaccination is recommended as part of routine immunisation for children, individuals with specific underlying conditions associated with increased risk of IPD and older Australians. More information on the scheduling of the pneumococcal vaccination can be found on the Immunise Australia Program website ([www.immunise.health.gov.au](http://www.immunise.health.gov.au)).

In this report, a 'vaccine failure' is reported when a child aged less than 5 years is diagnosed with IPD due to a serotype found in the 13vPCV and they have received 3 primary scheduled doses of 13vPCV at least 2 weeks prior to disease onset with at least 28 days between doses of vaccine.

There are currently two pneumococcal vaccines available in Australia via the National Immunisation Program, each targeting multiple serotypes (13vPCV and 23vPPV). Note that in this report serotype analysis is generally grouped according to vaccine composition, both historic and current (Table 5).

Follow-up of all notified cases of IPD is undertaken in all states and territories except New South Wales and Victoria, which conduct targeted follow-up of notified cases aged under 5 years, and 50 years or over for enhanced data. Follow-up of notified cases of IPD in Queensland

is undertaken in all areas except Metro South and Gold Coast Public Health Units, which conduct targeted follow-up of notified cases for those aged under 5 years only. However, in these areas where targeted case follow-up is undertaken, some enhanced data may also be available outside these targeted age groups.

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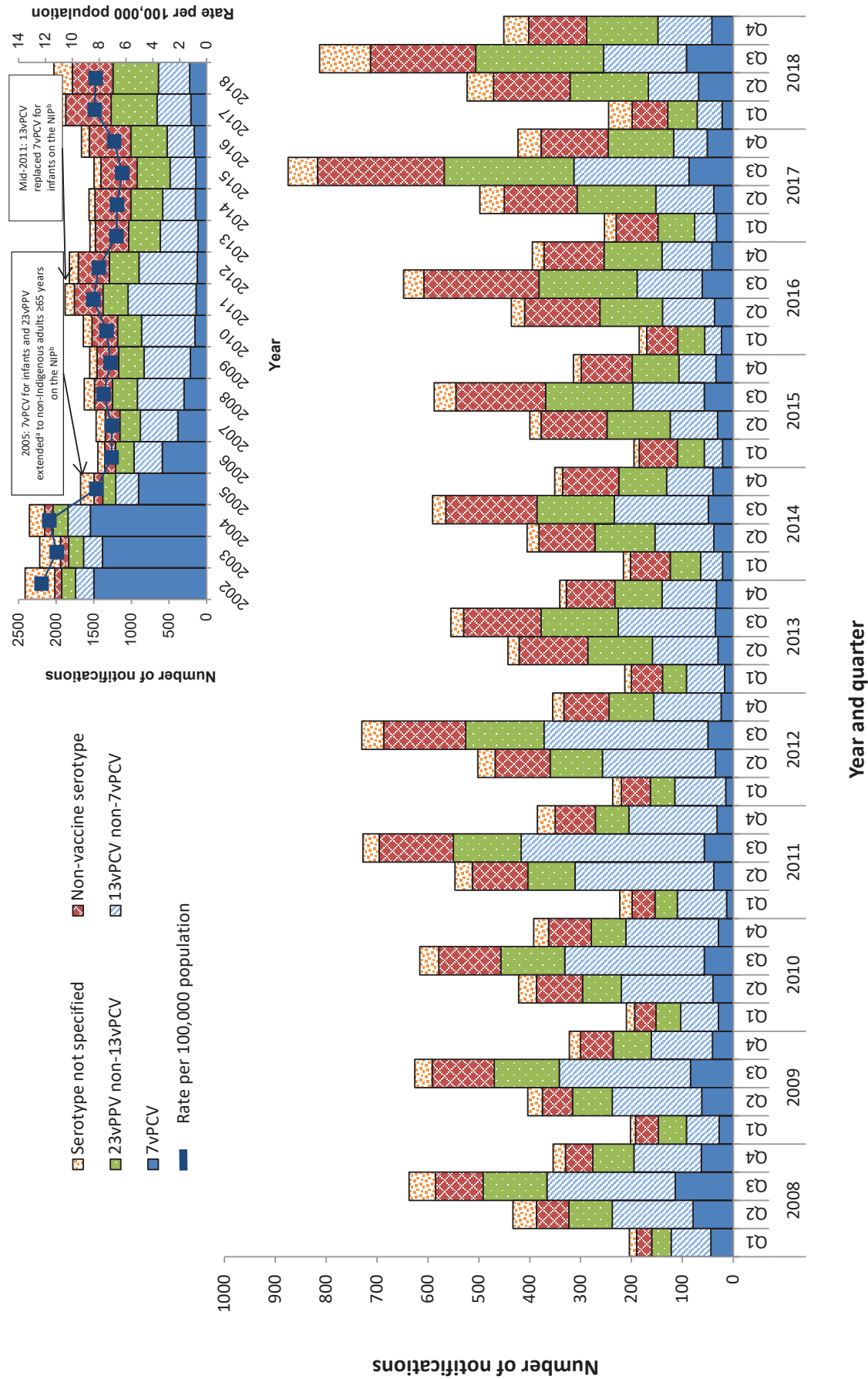
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Figure 1: Notifications of invasive pneumococcal disease, Australia, 1 January 2002 to 31 December 2018, by vaccine serotype group, year and quarter



a In 1999, the 23vPPV was funded for all Indigenous Australians aged 50 years and over, as well as younger Indigenous Australian adults with risk factors.  
 b NIP: National Immunisation Program.

**Table 1: Notified cases of invasive pneumococcal disease, Australia, 1 October to 31 December 2018, by Indigenous status, serotype completeness and state or territory**

Indigenous status	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total 4th qtr 2018	Total 3rd qtr 2018	Total 4th qtr 2017	2018
Indigenous	2	8	5	11	3	0	3	9	41	101	61	233
Non-Indigenous	3	120	4	60	25	7	119	39	377	641	324	1618
Not stated / Unknown	0	29	0	1	0	1	2	1	34	71	38	181
<b>Total</b>	<b>5</b>	<b>157</b>	<b>9</b>	<b>72</b>	<b>28</b>	<b>8</b>	<b>124</b>	<b>49</b>	<b>452</b>	<b>813</b>	<b>423</b>	<b>2032</b>
Indigenous status completeness <sup>a</sup> (%)	100	82	100	99	100	88	98	98	92	91	91	91
Indigenous status completeness in targeted groups <sup>a,b</sup> (%)	100	91	100	98	100	100	100	97	96	97	97	97
Serotype completeness <sup>c</sup> (%)	100	87	89	97	64	88	97	90	90	90	94	89

a Indigenous status completeness is defined as the reporting of a known Indigenous status, excluding the reporting of not stated or unknown Indigenous status.

b Targeted groups for follow-up by almost all jurisdictions and public health units are cases aged less than 5 years and 50 years and over.

c Serotype completeness is the proportion of all cases of invasive pneumococcal disease that were reported with a serotype or reported as non-typable. Incomplete serotype data can occur in cases when (i) no isolate was available as diagnosis was by polymerase chain reaction and no molecular typing was attempted or was not possible due to insufficient genetic material; (ii) the isolate was not referred to the reference laboratory or was not viable; (iii) typing was pending at the time of reporting, or no serotype was reported by the notifying jurisdiction to the National Notifiable Diseases Surveillance System.

**Table 2: Distribution of serotypes causing invasive pneumococcal disease in notified cases, Australia, 1 October to 31 December 2018, by age group**

Vaccine type and serotype	Age groups			Serotype total <sup>a</sup>
	Under 5	5-64	65+	
<b>7vPCV</b>				
4	0	5	0	5
14	0	3	5	8
19F	6	10	8	24
23F	0	1	3	4
<b>13vPCV non-7vPCV</b>				
3	10	34	24	68
7F	0	7	0	7
19A	10	8	9	27
1	0	2	0	2
<b>23vPPV non-13vPCV</b>				
8	0	12	6	18
15B	2	1	4	7
17F	0	2	1	3
22F	1	23	20	44
9N	3	15	6	24
10A	2	2	0	4
11A	0	10	6	16
12F	1	5	2	8
33F	2	7	7	16
<b>Non-vaccine type</b>				
6C	0	8	10	18
15A	1	2	4	7
15C	1	1	1	3
16F	1	3	2	6
23A	0	5	10	15
23B	1	8	9	18
24	0	3	2	5
31	0	2	10	12
35B	1	4	0	5
35F	2	2	3	7
38	0	0	0	8
34	1	2	0	3
<b>Other</b>				
Other serotypes <sup>a</sup>	2	5	12	11
Unknown <sup>b</sup>	13	27	9	49
<b>Total</b>	<b>60</b>	<b>219</b>	<b>173</b>	<b>452</b>

a Serotypes that only occur in less than 5 cases per quarter are grouped as 'Other' and include 'non-typable' isolates this quarter.

b 'Serotype unknown' includes those serotypes reported as 'no isolate', 'not referred', 'not viable', 'typing pending' and 'untyped'.



**Table 3: Notified cases of invasive pneumococcal disease, Australia, 1 October to 31 December 2018, by Indigenous status and age group**

Age group	Indigenous status			Total
	Indigenous	Non-Indigenous	Not reported <sup>a</sup>	
00–04	3	56	1	60
05–09	2	12	2	16
10–14	0	2	4	6
15–19	2	3	3	8
20–24	0	2	0	2
25–29	2	4	3	9
30–34	4	11	3	18
35–39	3	9	3	15
40–44	5	11	4	20
45–49	1	16	0	17
50–54	5	27	2	34
55–59	6	20	3	29
60–64	3	42	0	45
65–69	1	41	3	45
70–74	3	30	1	34
75–79	1	28	2	31
80–84	0	19	0	19
85+	0	44	0	44
<b>Total</b>	<b>41</b>	<b>377</b>	<b>34</b>	<b>452</b>

a Not reported is defined as not stated, blank or unknown Indigenous status.

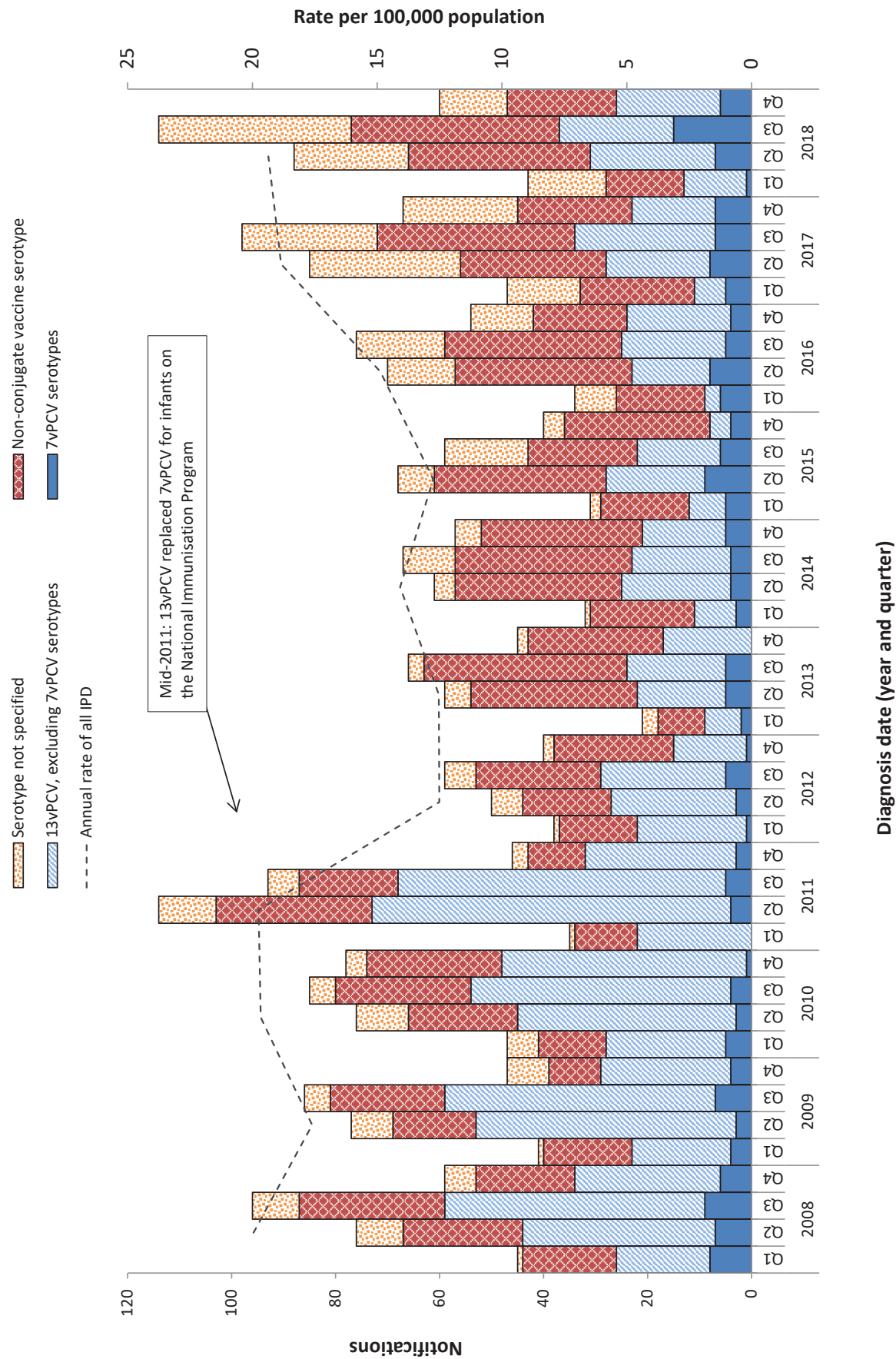
**Table 4: Characteristics of 13vPCV failures in children aged less than 5 years, Australia, 1 October to 31 December 2018**

Age	Indigenous status	Serotype	Clinical category	Risk factor(s)
11 months	Non-Indigenous	3	Pneumonia and other (pleural empyema)	Premature (<37 weeks gestation)
1 year	Non-Indigenous	19A	Pneumonia and other (pleural empyema)	No risk factor identified
1 year	Non-Indigenous	19F	Bacteraemia	Other
1 year	Non-Indigenous	19F	Other (septic arthritis)	Congenital or chromosomal abnormality
1 year	Non-Indigenous	19A	Meningitis	Childcare attendee
1 year	Non-Indigenous	19A	Pneumonia and other (pleural effusion)	No data available
1 year	Non-Indigenous	3	Pneumonia	Other
1 year	Non-Indigenous	19F	No data provided	Childcare attendee
2 years	Non-Indigenous	19A	Pneumonia and other (pleural empyema)	No data available
2 years	Non-Indigenous	19A	Pneumonia	Childcare attendee
2 years	Non-Indigenous	3	No data provided	No data available
3 years	Non-Indigenous	19A	Pneumonia	Chronic illness
3 years	Non-Indigenous	19A	Pneumonia	Premature (<37 weeks gestation)
4 years	Non-Indigenous	3	Pneumonia	Childcare attendee
4 years	Non-Indigenous	3	Pneumonia and other (pleural effusion)	No data available
4 years	Non-Indigenous	3	Pneumonia	No data available

Table 5: *Streptococcus pneumoniae* serotypes targeted by pneumococcal vaccines

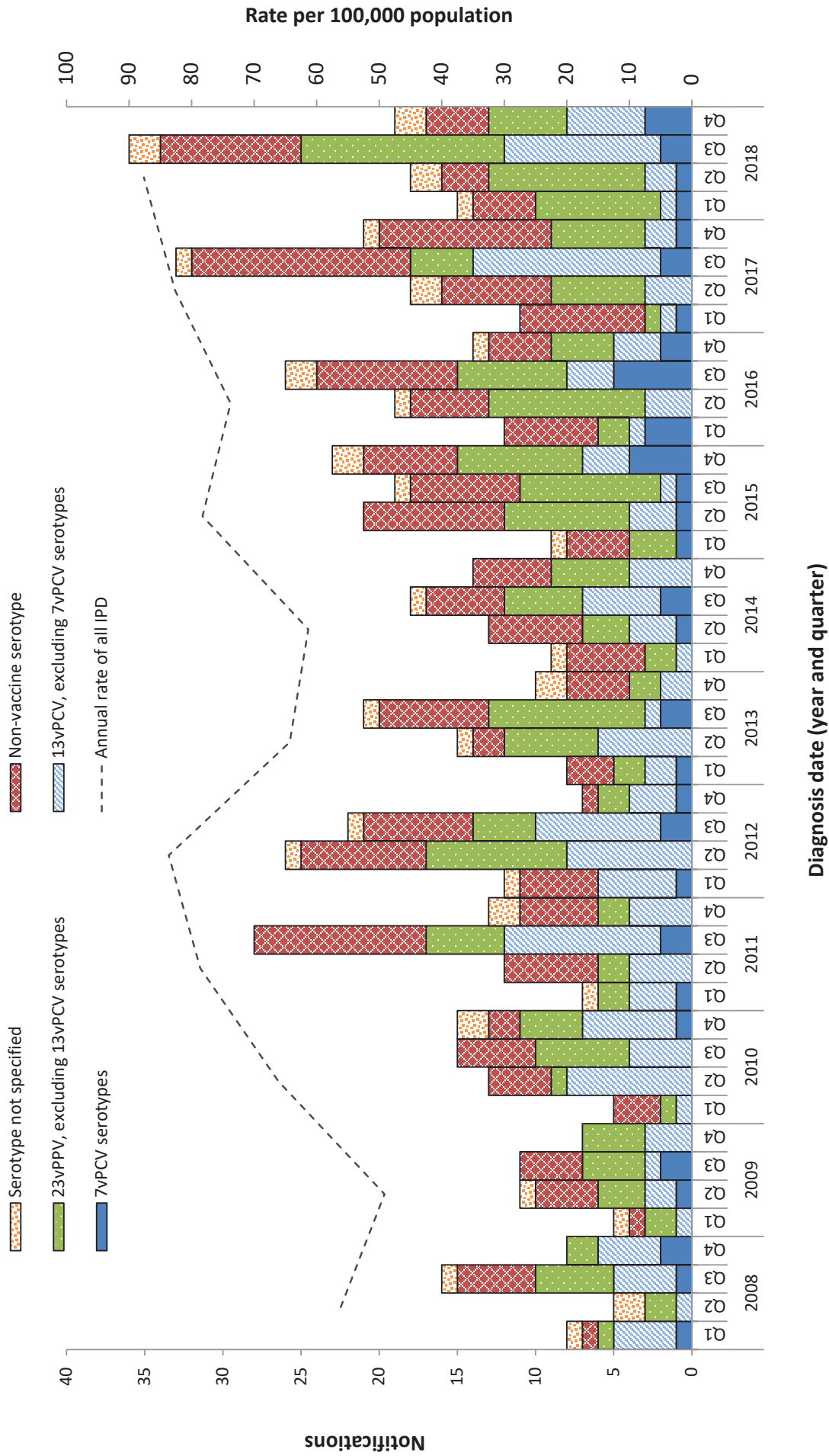
Serotypes	7-valent pneumococcal conjugate vaccine (7vPCV)	10-valent pneumococcal conjugate vaccine (10vPCV)	13-valent pneumococcal conjugate vaccine (13vPCV)	23-valent pneumococcal polysaccharide vaccine (23vPPV)
1		✓	✓	✓
2				✓
3			✓	✓
4	✓	✓	✓	✓
5		✓	✓	✓
6A			✓	
6B	✓	✓	✓	✓
7F		✓	✓	✓
8				✓
9N				✓
9V	✓	✓	✓	✓
10A				✓
11A				✓
12F				✓
14	✓	✓	✓	✓
15B				✓
17F				✓
18C	✓	✓	✓	✓
19A			✓	✓
19F	✓	✓	✓	✓
20				✓
22F				✓
23F	✓	✓	✓	✓
33F				✓

Figure 2: Notifications and annual rates<sup>a</sup> of invasive pneumococcal disease in children aged less than 5 years, Australia, 1 January 2008 to 31 December 2018, by vaccine serotype group



a Annual rates are shown on quarter 2.

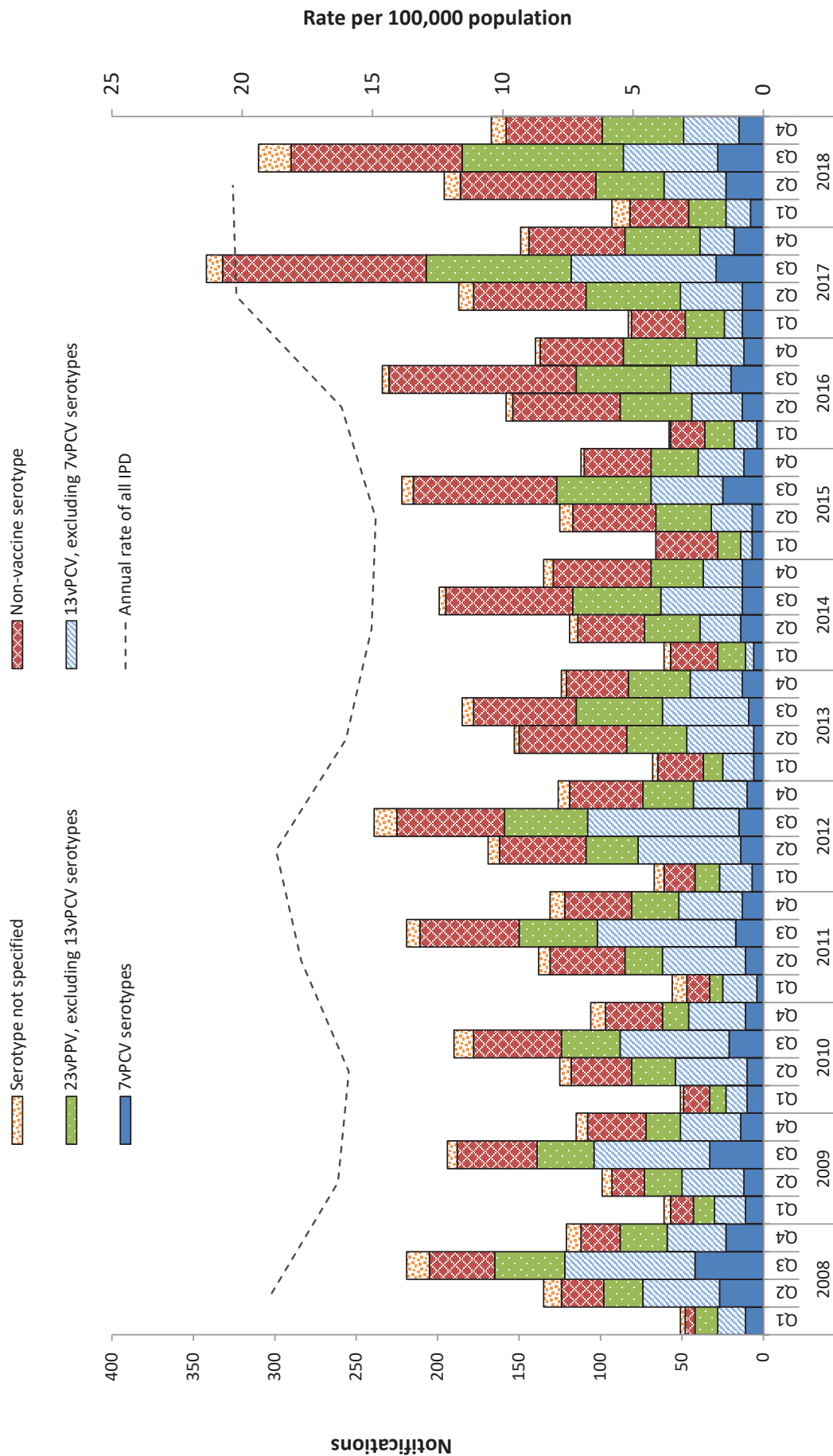
Figure 3: Notifications and annual rates<sup>a</sup> of all invasive pneumococcal disease in Indigenous Australians aged 50 years or over, Australia, 1 January 2008 to 31 December 2018, by vaccine serotype group



<sup>a</sup> Annual rates are shown on quarter 2.



Figure 4: Notifications and annual rates<sup>a</sup> of all invasive pneumococcal disease in non-indigenous Australians<sup>b</sup> aged 65 years or over, Australia, 1 January 2008 to 31 December 2018, by vaccine serotype group



Diagnosis date (year and quarter)

a Annual rates are shown on quarter 2.  
 b Non-Indigenous Australians includes cases reported with as non-Indigenous, not stated, blank or unknown.