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Invasive Pneumococcal Disease Surveillance, 1 January to 31 March 2018

Kate Pennington and the Enhanced Invasive Pneumococcal Disease Surveillance Working Group, for the Communicable Diseases Network Australia

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Invasive Pneumococcal Disease Surveillance, 1 January to 31 March 2018ⁱ

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for the Communicable Diseases Network Australia

Summary

The number of notified cases of invasive pneumococcal disease (IPD) in the first quarter of 2018 was substantially less than the previous quarter, and similar to the first 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 13vPCV across all age groups; however, more recently this decline is no longer evident. Further, over this period there has been a steady increase across all age groups (Figure 1) in the number of cases due to the eleven serotypes additionally covered by the 23-valent pneumococcal polysaccharide vaccine (23vPPV) and also to those serotypes not covered by any available vaccine.

Key points

In the first quarter of 2018, there were 240 cases of IPD reported to the National Notifiable Disease Surveillance System (NNDSS). Compared to the number of cases notified in the previous quarter (n=418), this represented a substantial decrease in cases (43%), but was similar to the number of cases reported in the same quarter in 2017 (n=254) (Table 1). In the first quarter of 2018, the most common pneumococcal serotype causing IPD was serotype 3 (13.3%), followed by 9N (6.7%) and 19A (6.3%) (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 65 years or older (Table 3). Among Indigenous Australians, notifications tended to be highest among children aged less than 5 years and adults

aged 35 to 39 years, as well as those aged 65 years and over. The proportion of cases reported as Indigenous Australians this quarter (13%; 31/240) was similar to the proportion observed in the previous quarter (14%; 60/418) and also in the first quarter of 2017 (12%; 30/254) (Table 1).

In children aged less than 5 years, there were 42 cases of IPD reported, representing 18% (42/240) of all cases reported in this quarter. The proportion of cases notified in this age group was higher in this reporting period than that for the previous quarter (16%; 66/418), and similar to the proportion reported in the first quarter of 2017 (19%; 47/254). Of those cases aged less than 5 years with a known serotype reported this quarter (n=26), 42% (11/26) were due to a serotype included in 13vPCV, compared with 52% (23/44) of cases in the previous quarter and 57% (24/42) in the first quarter of 2017 (Figure 2). Of the 11 cases with 13vPCV serotypes in the first quarter of 2018, 9 cases were reported in fully vaccinated children aged less than 5 years and considered to be 13vPCV failures. These 13vPCV failures were due to serotypes 3 (n=8) and 19A (n=1) (Table 4). During this quarter the

ⁱ Based on data extracted from the National Notifiable Diseases Surveillance System (NNDSS) on 1 May 2018. Due to the dynamic nature of the NNDSS, data on this extract are subject to retrospective revision and may vary from data reported in published NNDSS reports and reports of notification data by states and territories.

main serotype affecting children aged less than 5 years age group was serotype 3 (35%; 9/26), which is included in 13vPCV.

Among Indigenous Australians aged 50 years and over, there were 14 cases of IPD reported this quarter. Of those cases with a reported serotype (n=12), 8 (67%) were due to a serotype included in 23vPPV, and overall there was no particular serotype dominant (Figure 3). The number of notified cases of IPD in this population group was lower than the number of cases reported in the previous quarter (n=21), and slightly higher than the number reported in the first quarter of 2017 (n=11).

Among non-Indigenous Australiansⁱⁱ aged 65 years and over there were 91 cases of IPD reported this quarter. The number of notified cases of IPD in this population group was 38% lower than the number of cases reported in the previous quarter (n=147) and higher than the number reported in the first quarter of 2017 (n=83). Of those cases with a reported serotype (n=77), 56% (43/77) were due to a serotype included in 23vPPV (Figure 4). This was less than the proportion in the previous quarter (59%; 83/141) and also in the first quarter of 2017 (59%; 48/81). For this quarter, serotypes 3 (n=10), 11A (n=7) and 23A (n=7) were the most common serotypes for this population group. All of these serotypes, except 23A, are included in 23vPPV.

During this quarter there were 18 deaths attributed to a variety of IPD serotypes. Eight of the cases had a serotype covered by currently available pneumococcal vaccines, 6 were due to a non-vaccine serotype, and the serotype of the four remaining cases was not able to be determined. Almost all of the reported deaths (83%; n=15) occurred in non-Indigenous Australians. The median age of those cases reported to have died this quarter was 64 years (range 0 to 92 years).

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

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).

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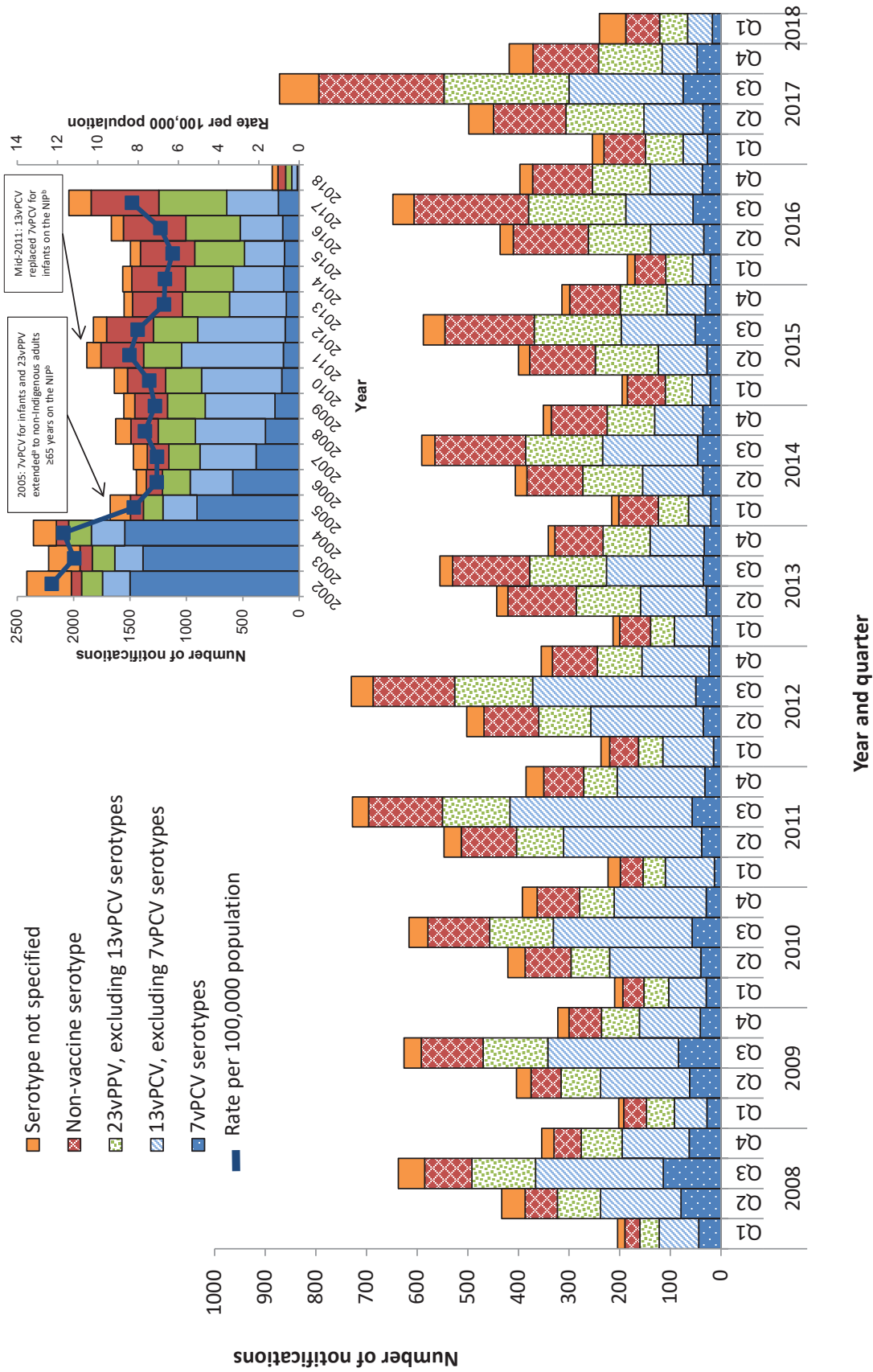
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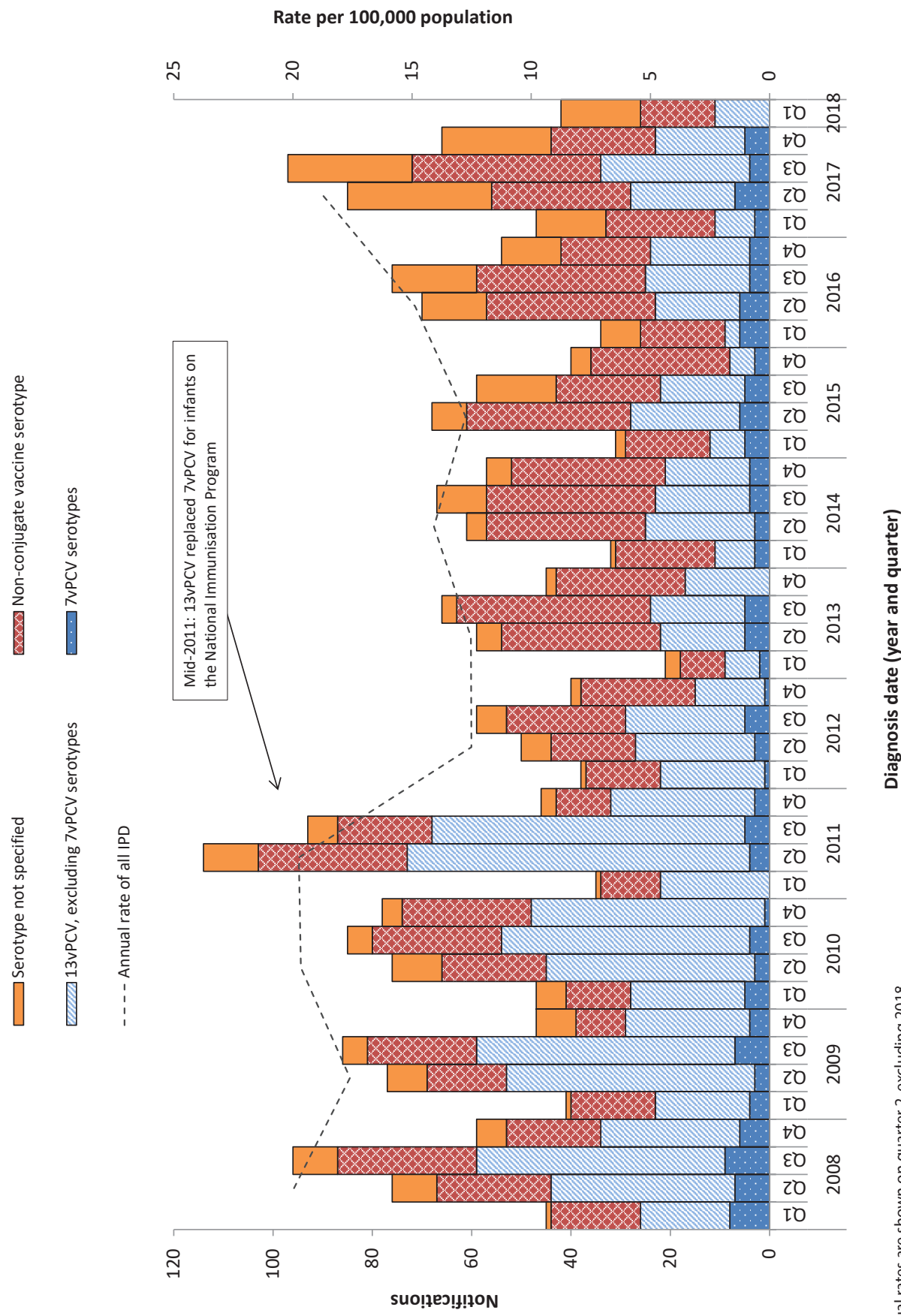
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Figure 1: Notifications of invasive pneumococcal disease, Australia, 1 January 2002 to 31 March 2018, by vaccine serotype group, year and quarter



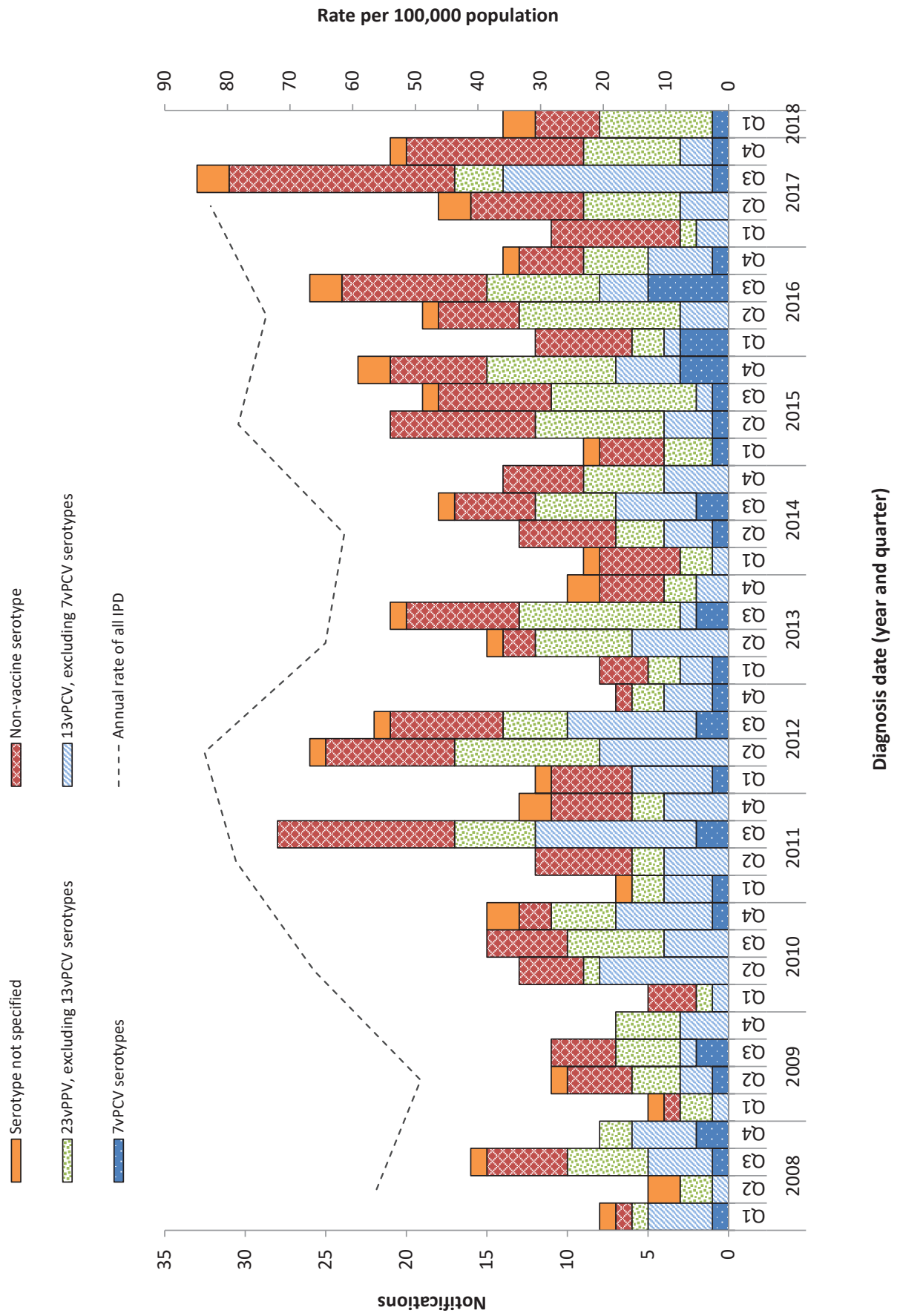
a In 1999, the 23vPPV was funded for all Indigenous Australians aged 50 years and over, as well as younger Indigenous Australian adults with risk factors.
 b NIP - National Immunisation Program.

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



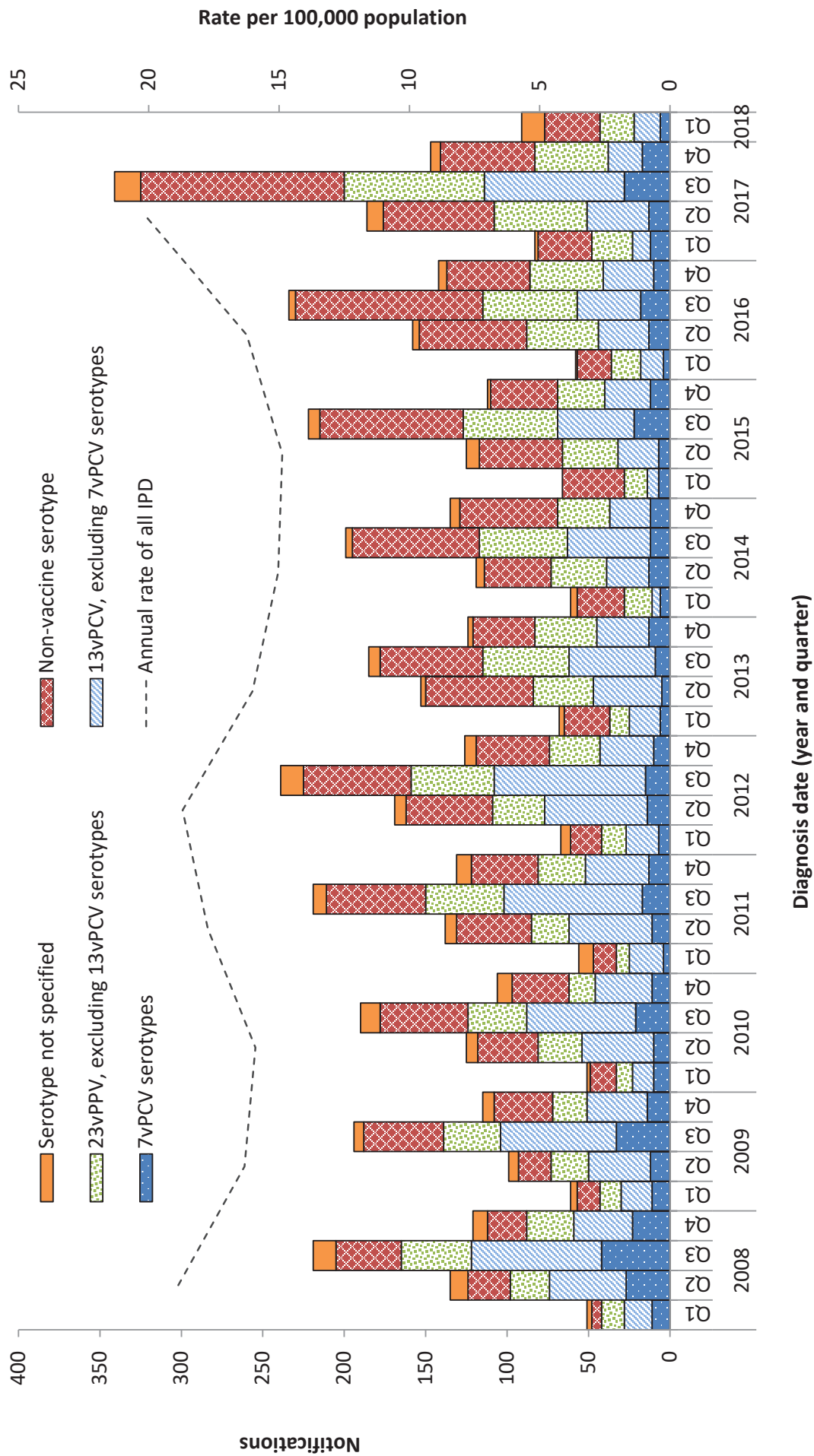
^a Annual rates are shown on quarter 2, excluding 2018.

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



^a Annual rates are shown on quarter 2, excluding 2018.

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



^a Annual rates are shown on quarter 2, excluding 2018.

^b Non-Indigenous Australians includes cases reported with as non-Indigenous, not stated, blank or unknown.

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

Indigenous status	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total 1st qtr 2018	Total 4th qtr 2017	Total 1st qtr 2017	Year to date 2018
Indigenous	0	5	4	11	2	0	1	8	31	60	30	31
Non-Indigenous	2	58	1	42	15	5	39	19	181	314	194	181
Not stated / Unknown	0	11	0	0	0	0	17	0	28	44	30	28
Total	2	74	5	53	17	5	57	27	240	418	254	240
Indigenous status completeness ^a (%)	100	85	100	100	100	100	70	100	88	89	88	88
Indigenous status completeness in targeted groups ^{a,b} (%)	100	89	100	100	100	100	86	100	93	95	95	93
Serotype completeness ^c (%)	100	59	100	98	35	100	95	81	79	92	94	79

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 followup 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 January to 31 March 2018, by age group

Serotype	Vaccine type	Age groups			Serotype total
		Under 5 years	5-64 years	Over 65 years	
3	13vPCV non-7vPCV	9	13	10	32
9N	23vPPV non-13vPCV	1	11	4	16
19A	13vPCV non-7vPCV	2	7	6	15
23A	Non-vaccine type	1	4	7	12
23B	Non-vaccine type	2	5	5	12
11A	23vPPV non-13vPCV	–	3	7	10
22F	23vPPV non-13vPCV	2	5	3	10
15A	Non-vaccine type	2	4	2	8
19F	7vPCV	–	4	4	8
35B	Non-vaccine type	2	1	5	8
16F	Non-vaccine type	–	–	6	6
8	23vPPV non-13vPCV	–	4	1	5
33F	23vPPV non-13vPCV	–	2	3	5
6C	Non-vaccine type	1	–	4	5
31	Non-vaccine type	–	–	3	3
38	Non-vaccine type	1	1	1	3
10A	23vPPV non-13vPCV	–	1	2	3
15C	Non-vaccine type	1	2	–	3
12F	23vPPV non-13vPCV	1	1	–	2
15B	23vPPV non-13vPCV	–	1	1	2
17F	23vPPV non-13vPCV	–	1	1	2
18A	Non-vaccine type	–	–	2	2
18C	7vPCV	–	2	–	2
23F	7vPCV	–	1	1	2
35F	Non-vaccine type	–	1	1	2
9V	7vPCV	–	1	1	2
4	7vPCV	–	1	–	1
13	Non-vaccine type	–	1	–	1
14	7vPCV	–	–	1	1
Other ^a		1	4	–	5
Unknown ^b		16	22	14	52
Total		42	103	95	240

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 January to 31 March 2018, by Indigenous status and age group

Age group	Indigenous status			Total
	Indigenous	Non-Indigenous	Not reported ^a	
00-04	5	36	1	42
05-09	1	5	3	9
10-14	0	2	0	2
15-19	0	0	0	-
20-24	2	1	0	3
25-29	0	5	3	8
30-34	1	1	2	4
35-39	6	5	4	15
40-44	1	6	3	10
45-49	1	4	0	5
50-54	3	10	1	14
55-59	3	16	0	19
60-64	4	9	1	14
65-69	2	14	1	17
70-74	1	18	1	20
75-79	0	14	0	14
80-84	1	16	2	19
85+	0	19	6	25
Total	31	181	28	240

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 January to 31 March 2018

Age	Indigenous status	Serotype	Clinical category	Risk factor(s)
11 months	Indigenous	3	Pneumonia	Other
1 year	Non-Indigenous	3	Pneumonia	No data available
1 year	Non-Indigenous	3	Pneumonia	No risk factor identified
1 year	Non-Indigenous	3	Pneumonia	Other
1 year	Indigenous	3	Pneumonia and other (pleural effusion)	No data available
1 year	Unknown	3	Pneumonia	Other
2 years	Non-Indigenous	19A	Bacteraemia	Childcare attendee
2 years	Non-Indigenous	3	Pneumonia	Other
3 years	Non-Indigenous	3	Other	Other

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				✓