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Invasive Pneumococcal Disease Surveillance, 1 July to 30 September 2017

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Invasive Pneumococcal Disease Surveillance, 1 July to 30 September 2017ⁱ

Kate Pennington 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 third quarter of 2017 was greater than the previous quarter and also the third quarter of 2016. 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 in 2017 this decline is no longer evident. Further, 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

In the third quarter of 2017, there were 870 cases of IPD reported to the National Notifiable Disease Surveillance System (NNDSS). Compared with the number of cases notified in the previous quarter (n=500), this represented a substantial increase in cases (75%), and compared with the same quarter in 2016 (n=647) there was a 34% increase in the number of cases (Table 1). The increase observed in this quarter was consistent with the seasonal increase in cases observed in quarters two and three each year (Figure 1), with IPD notification activity during this period tending to correlate with the winter influenza seasons. The unexpectedly higher levels of IPD observed over the past quarter may potentially have been influenced by the increased seasonal influenza activity levels that have also been observed over this period. In the third quarter of 2017, the most common pneumococcal serotypes causing IPD were 3 (14.6%), 19A (7.5%) and 9N (6.9%) (Table 2).

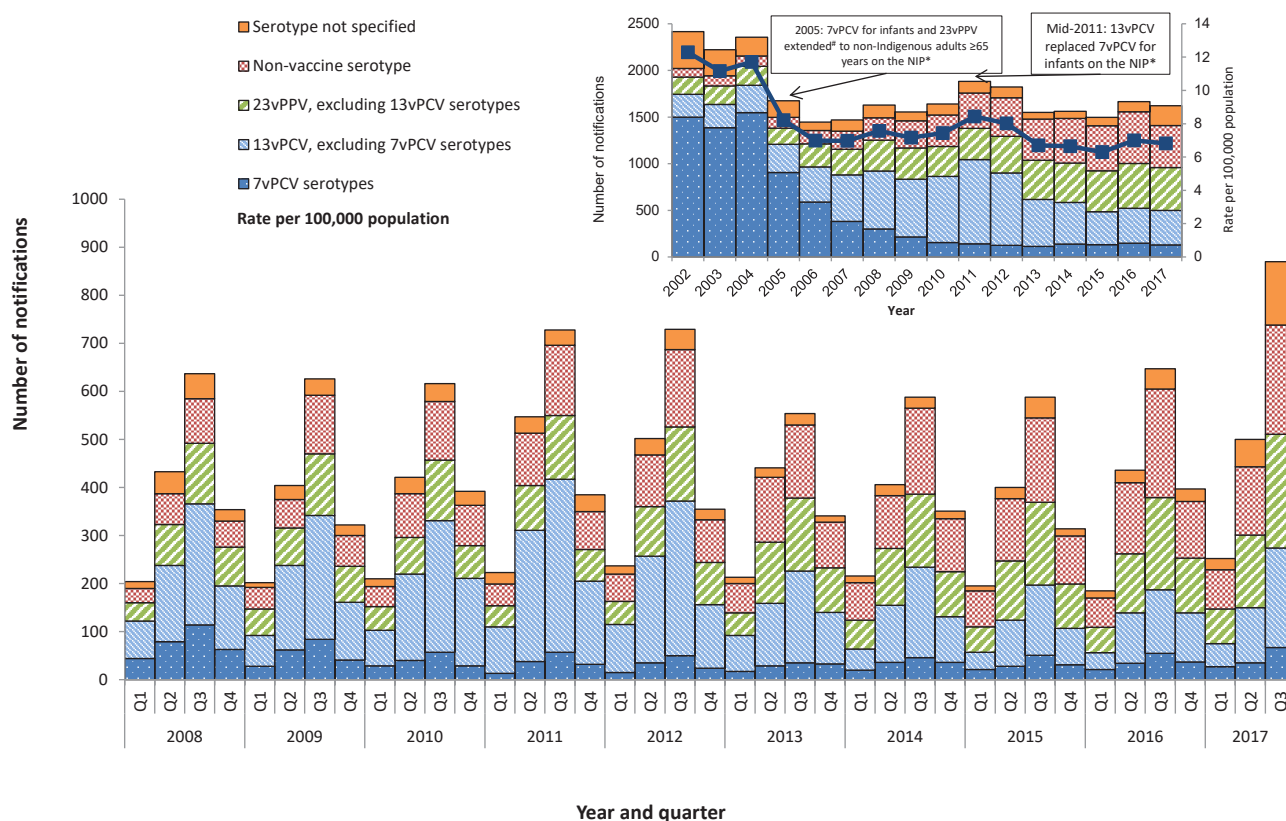
Among non-Indigenousⁱⁱ Australians this quarter, the number of notified cases continued to be highest in children aged less than 5 years and older adult age groups, especially those aged 60 years or older (Table 3). Among Indigenous Australians, notifications tended to be highest among adults aged 25 to 64 years. The proportion of cases reported as Indigenous Australians this quarter (11%; 97/870) was higher compared with the proportion observed in the previous quarter (8%; 41/500), and similar compared to the proportion reported in the third quarter of 2016 (12%; 75/647) (Table 1).

In children aged less than 5 years, there were 97 cases of IPD reported, representing 11% (97/870) of all cases reported in this quarter. The proportion of cases notified in this age group was lower in this reporting period when compared with the previous quarter (17%; 85/500), and similar compared to the proportion reported in the third quarter of 2016 (12%; 76/647). Of those cases aged less than 5 years with a known serotype

i Based on data extracted from the National Notifiable Diseases Surveillance System (NNDSS) on 2 November 2017. 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.

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

Figure 1: Notifications of invasive pneumococcal disease, Australia, 1 January 2002 to 30 September 2017, by vaccine serotype group, year and quarter



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.

* NIP - National Immunisation Program.

reported this quarter, 46% (29/63) were due to a serotype included in the 13vPCV, compared with 48% (26/54) of cases in the previous quarter and 42% (25/59) in the third quarter of 2016 (Figure 2). Of the 29 cases with 13vPCV serotypes in the third quarter of 2017, 20 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 19A (n=12) and 3 (n=8) (Table 4). During this quarter the main serotypes affecting children aged less than 5 years were 19A (22%; 14/63), followed by 3 (17%; 11/63) (Table 2). Both of these serotypes are included in the 13vPCV.

Among Indigenous Australians aged 50 years and over, there were 33 cases of IPD reported this quarter. Of those cases with a reported serotype (n=27), 16 (59%) were due to a serotype included in the 23vPPV, with half of these cases

due to serotype 3 (n=8) (Figure 3). The number of notified cases of IPD in this population group were higher than the number of cases reported in both the previous quarter (n=18) and also the number reported in the third quarter of 2016 (n=26).

Among non-Indigenous Australians aged 65 years and over there were 339 cases of IPD reported this quarter. The number of notified cases of IPD in this population group were 80% higher compared to the number of cases reported in the previous quarter (n=188) and 45% higher than the number reported in the third quarter of 2016 (n=234). Of those cases with a reported serotype (n=306), almost two-thirds (62%; 190/306) were due to a serotype included in the 23vPPV (Figure 4), which was similar to the proportion in the previous quarter (62%; 107/175). For this quarter, serotype 3 (n=59) was the most

Table 1: Notified cases of invasive pneumococcal disease, Australia, 1 July to 30 September 2017, by Indigenous status, serotype completeness and state or territory

Indigenous status	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Total 3rd qtr 2017	Total 2nd qtr 2017	Total 3rd qtr 2016	Year to date 2017
Indigenous	0	15	26	25	8	1	0	22	97	41	75	168
Non-Indigenous	5	237	6	114	73	19	137	64	655	401	521	1245
Not stated / Unknown	0	46	0	0	1	1	70	0	118	58	51	209
Total	5	298	32	139	82	21	207	86	870	500	647	1,622
Indigenous status completeness* (%)	100	85	100	100	99	95	66	100	86	88	92	87
Indigenous status completeness in targeted groups ^{††} (%)	100	90	100	100	98	94	84	100	92	94	98	93
Serotype completeness [‡] (%)	100	76	94	96	62	95	96	92	85	91	96	88

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

† Targeted groups for followup by almost all jurisdictions and public health units are cases aged less than 5 years and 50 years and over.

‡ 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 July to 30 September 2017, by age group

Serotype	Vaccine type	Age groups			Serotype total
		Under 5 years	5-64 years	Over 65 years	
3	13vPCV non-7vPCV	11	55	61	127
19A	13vPCV non-7vPCV	14	28	23	65
9N	23vPPV non-13vPCV	1	35	24	60
22F	23vPPV non-13vPCV	1	31	22	54
19F	7vPCV	4	20	21	45
23A	Non-vaccine type	1	7	25	33
8	23vPPV non-13vPCV	4	19	5	28
6C	Non-vaccine type	1	10	17	28
11A	23vPPV non-13vPCV	3	15	9	27
33F	23vPPV non-13vPCV	2	13	10	25
15A	Non-vaccine type	2	6	15	23
16F	Non-vaccine type	-	8	12	20
35B	Non-vaccine type	2	6	11	19
23B	Non-vaccine type	5	5	8	18
7F	13vPCV non-7vPCV	-	14	-	14
18A	Non-vaccine type	-	11	1	12
31	Non-vaccine type	-	6	5	11
38	Non-vaccine type	1	4	6	11
12F	23vPPV non-13vPCV	-	10	1	11
15C	Non-vaccine type	2	4	4	10
15B	23vPPV non-13vPCV	2	5	2	9
17F	23vPPV non-13vPCV	-	5	4	9
14	7vPCV	-	5	2	7
20	23vPPV non-13vPCV	-	2	5	7
10A	23vPPV non-13vPCV	2	3	2	7
24	Non-vaccine type	1	3	2	6
35F	Non-vaccine type	-	3	3	6
13	Non-vaccine type	-	4	1	5
34	Non-vaccine type	1	3	1	5
Other	-	3	22	11	36
Unknown	-	34	60	38	132
Total		97	422	351	870

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

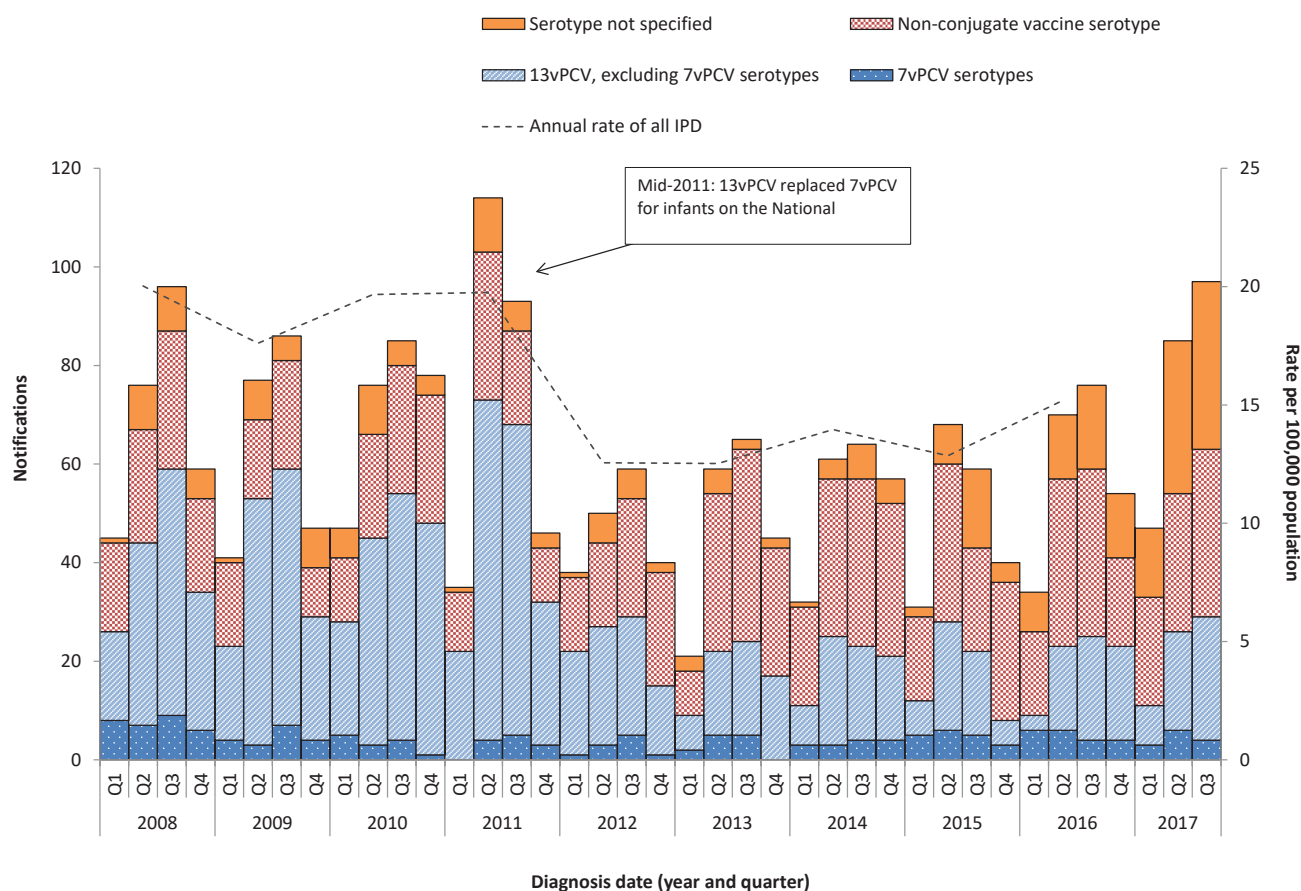
† 'Serotype unknown' includes those serotypes reported as 'no isolate', 'not referred', 'not viable', 'typing pending' and 'untyped'.

Table 3: Notified cases of invasive pneumococcal disease, Australia, 1 July to 30 September 2017, by Indigenous status and age group

Age group	Indigenous status			Total
	Indigenous	Non-Indigenous	Not reported*	
00–04	4	91	2	97
05–09	2	19	5	26
10–14	5	3	6	14
15–19	5	5	5	15
20–24	4	6	4	14
25–29	8	5	3	16
30–34	9	12	8	29
35–39	8	18	14	40
40–44	9	14	11	34
45–49	10	20	11	41
50–54	8	39	6	53
55–59	2	36	5	43
60–64	11	74	12	97
65–69	5	67	10	82
70–74	3	64	3	70
75–79	2	48	4	54
80–84	0	58	6	64
85+	2	76	3	81
Total	97	655	118	870

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

Figure 2: Notifications and annual rates* of invasive pneumococcal disease in children aged less than 5 years, Australia, 1 January 2008 to 30 September 2017, by vaccine serotype group



* Annual rates are shown on quarter 2, excluding 2017.

common serotype for this population group followed by 23A (n=25), 9N (n=23), 19A (n=22), 22F (n=22) and 19F (n=22). All of these serotypes, except 23A, are included in the 23vPPV.

During this quarter there were 65 deaths attributed to a variety of IPD serotypes, with serotypes 9N (n=9), 3 (n=8) and 19F (n=6) being the most common. Almost all of the reported deaths (92%; n=60) occurred in non-Indigenous Australians. The median age of those cases reported to have died this quarter was 67 years (range 0 to 102 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*.

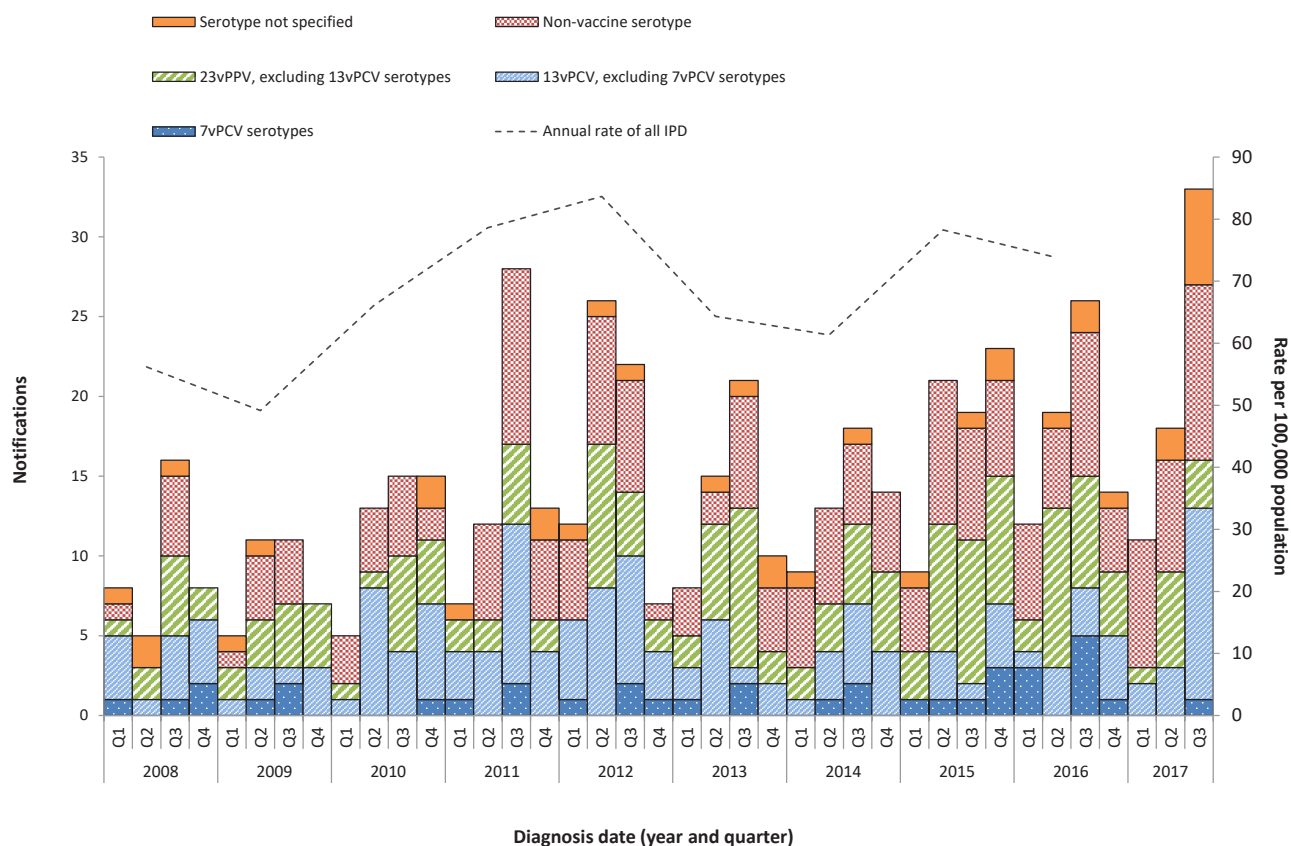
In Australia, pneumococcal vaccination is recommended as part of routine immunisation for children, individuals with specific underlying conditions associated with increased risk of IPD and older Australians. More information on the scheduling of the pneumococcal vaccination can be found on the [Immunise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

Table 4: Characteristics of 13vPCV failures in children aged less than 5 years, Australia, 1 July to 30 September 2017

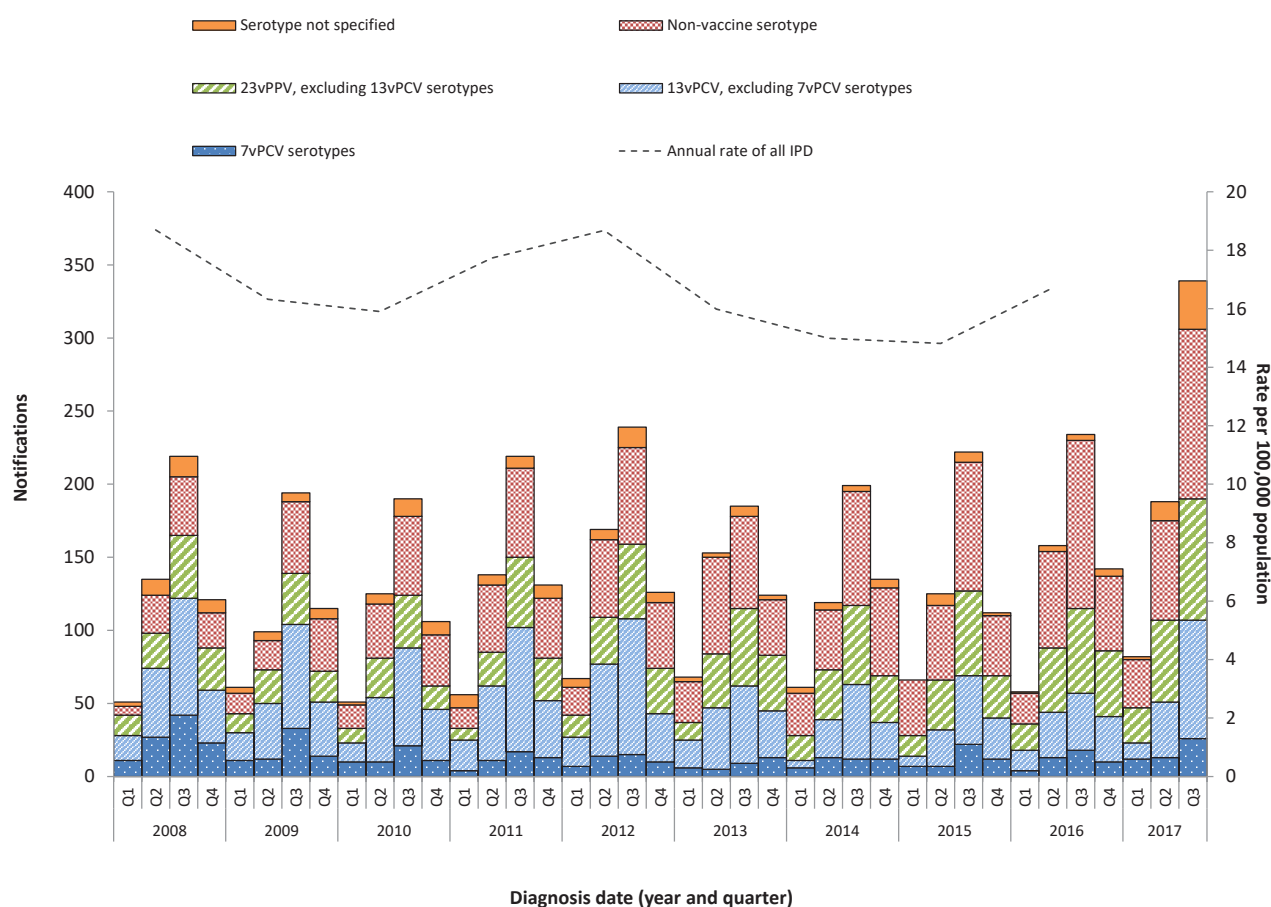
Age	Indigenous status	Serotype	Clinical category	Risk factor(s)
11 months	Non-Indigenous	19A	Septic arthritis	Childcare attendee
1 year	Non-Indigenous	19A	Other sterile site	No data available
1 year	Non-Indigenous	19A	Other sterile site	Premature (<37 weeks gestation)
1 year	Non-Indigenous	19A	Bacteraemia	No data available
1 year	Non-Indigenous	3	Pneumonia and other (pleural effusion)	Unknown
1 year	Non-Indigenous	19A	Bacteraemia	No data available
1 year	Non-Indigenous	19A	Other sterile site	Childcare attendee
1 year	Non-Indigenous	19A	Pneumonia	No data available
2 years	Non-Indigenous	3	Other sterile site	Other
2 years	Non-Indigenous	3	Pneumonia and other (pleural effusion)	No data available
2 years	Non-Indigenous	19A	Pneumonia	Childcare attendee
2 years	Non-Indigenous	19A	Other sterile site	Childcare attendee
2 years	Non-Indigenous	19A	Pneumonia	Childcare attendee
2 years	Non-Indigenous	3	Pneumonia	No data available
2 years	Non-Indigenous	19A	Pleural effusion	No risk factor identified
2 years	Non-Indigenous	3	Pneumonia and other (pleural effusion)	No data available
3 years	Indigenous	3	Pneumonia	No risk factor identified
3 years	Non-Indigenous	19A	Pneumonia and other (pleural empyema)	Other
3 years	Non-Indigenous	3	Pneumonia and other (pleural effusion)	Childcare attendee
3 years	Non-Indigenous	3	Pneumonia	Congenital or chromosomal abnormality

Figure 3: Notifications and annual rates* of all invasive pneumococcal disease in Indigenous Australians aged 50 years or over, Australia, 1 January 2008 to 30 September 2017, by vaccine serotype group



* Annual rates are shown on quarter 2, excluding 2017.

Figure 4: Notifications and annual rates* of all invasive pneumococcal disease in non-indigenous Australians# aged 65 years or over, Australia, 1 January 2008 to 30 September 2017, by vaccine serotype group



* Annual rates are shown on quarter 2, excluding 2017.

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

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				✓

There are 3 pneumococcal vaccines available in Australia, each targeting multiple serotypes (Table 5). Note that in this report serotype analysis is generally grouped according to vaccine composition.

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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