



SUMMARY

- Nationally the number of invasive meningococcal disease (IMD) cases and overall risk remains low; however, since 2013, serogroup W (MenW) has emerged as a considerable cause of IMD.
- From 2002 to 2015 the predominant meningococcal serogroup in Australia was serogroup B (MenB). However, in 2016, MenW became the predominant meningococcal serogroup in Australia with a total of 108 cases reported to the National Notifiable Diseases Surveillance System (NNDSS).
- In 2017 year-to-date (YTD), a total of 358 cases of IMD have been reported to the NNDSS. Of these, 136 cases were due to MenB, 128 cases were due to MenW, 69 cases were due to serogroup Y (MenY), 14 cases were due to serogroup C (MenC) and the remaining 11 cases are yet to be classified.
- So far in 2017, MenW cases have been reported across all jurisdictions, except the Australian Capital Territory.
- In 2017, YTD, a total of 56 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples. Of these, 13 cases were due to MenB, 41 cases were due to MenW and 2 cases were due to MenY.
- IMD follows a seasonal trend in Australia with notifications usually peaking in winter and early spring. However in 2016, notifications peaked later with 37 cases reported in October. In 2017 YTD notifications were higher compared with the same months in previous years, with highest number of monthly cases reported in September (n=68) of 2017.
- While cases of MenW are more common in adults, there has been an increase in cases in children aged less than 10 years since 2015.
- Many MenW strains identified in Australia belong to the hypervirulent sequence type ST 11, which is part of the clonal complex 11 (CC 11). ST11 is associated with a higher risk of invasive disease and a higher case fatality rate. Fourteen deaths have occurred in 2017 YTD due to MenW.
- Also of interest is the increase in MenY notifications, which is accounting for an increasing proportion of cases since 2011. A total of 69 cases of MenY were reported in 2017 YTD, accounting for 19% of notifications, compared with 40 cases (17%) in 2016, 22 cases (12%) in 2015 and 12 cases (7%) in 2014.

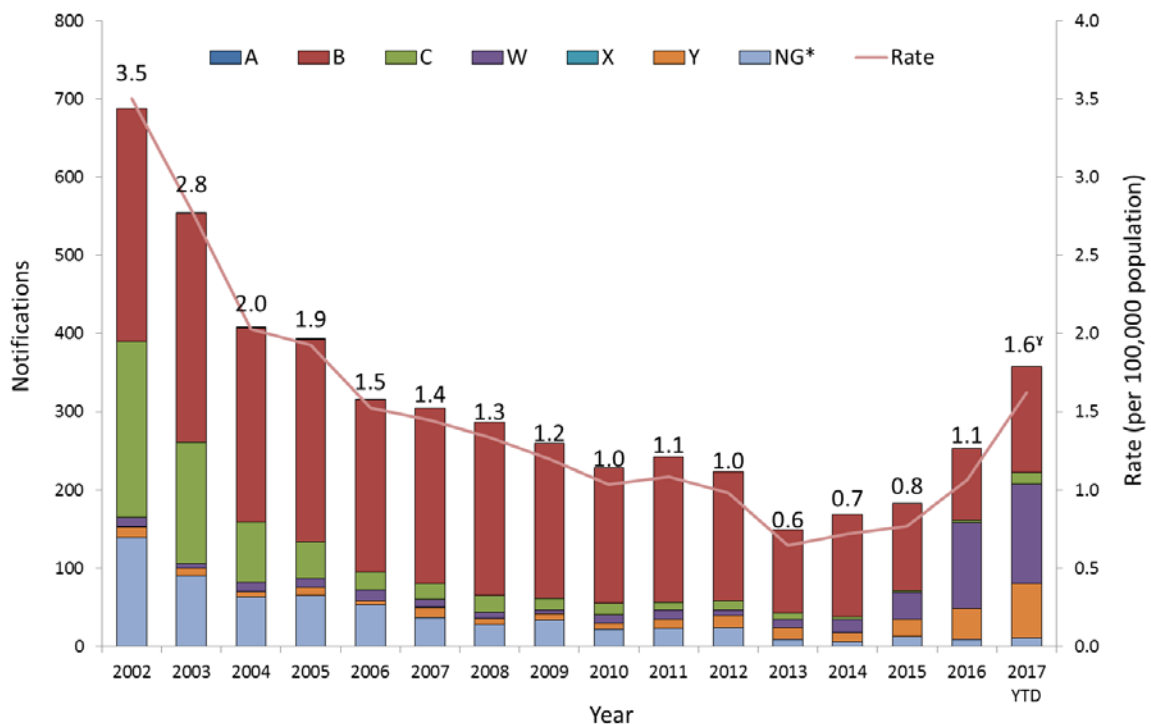
ANALYSIS

Serogroup trends

- Overall, the national incidence of IMD in Australia is low. Following the introduction of the meningococcal C (MenC) vaccine on the National Immunisation Program (NIP) the overall rate of IMD decreased by 82% from 3.5 per 100,000 (685 cases) in 2002 to 0.6 per 100,000 (147 cases) in 2013. However from 2014, IMD notifications increased with numbers YTD in 2017 the highest since 2005. The four most common meningococcal serotypes in Australia are B, C, W and Y.
- Since 2013, the overall rate of IMD has increased in Australia. In 2017 YTD, there have been a total of 358 cases of IMD (1.5 per 100,000 (annualised rate 1.6 per 100,000)) compared with 252 IMD cases in 2016 (1.1 per 100,000) (Figure 1).

- From 2002 to 2015 the predominant meningococcal serogroup in Australia was MenB, accounting for between 43% and 78% of notifications annually. So far in 2017, 38% of IMD cases (n=136) notified to the NNDSS are MenB.
- MenC, the target of a national immunisation program since 2003, has dramatically declined from 225 notifications in 2002 to 3 notifications in 2016 (a 99% decline). So far in 2017, 14 MenC cases have been notified to the NNDSS.
- Notifications of MenW doubled from 2014 (n=17) to 2015 (n=34), then more than tripled in 2016 (n=108). In 2017 YTD, 36% of IMD cases (n=128) notified to the NNDSS are MenW.
- Annual notifications of MenY have ranged from 5 to 40 since 2002, with an increasing trend since 2011. In 2016, there were 40 notifications of MenY compared with 22 and 12 in 2015 and 2014, respectively. In 2017 YTD, 69 MenY cases have been notified to the NNDSS, accounting for 19% of notifications.
- Serogroup A (MenA) and serogroup X (MenX) are rare, with a total of only 4 and 2 notifications respectively since 2002. There have been no notifications of either MenA or MenX in 2017 YTD.

Figure 1. Notifications and rates of IMD, Australia, 2002 to 2017 YTD[#], by serogroup



[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

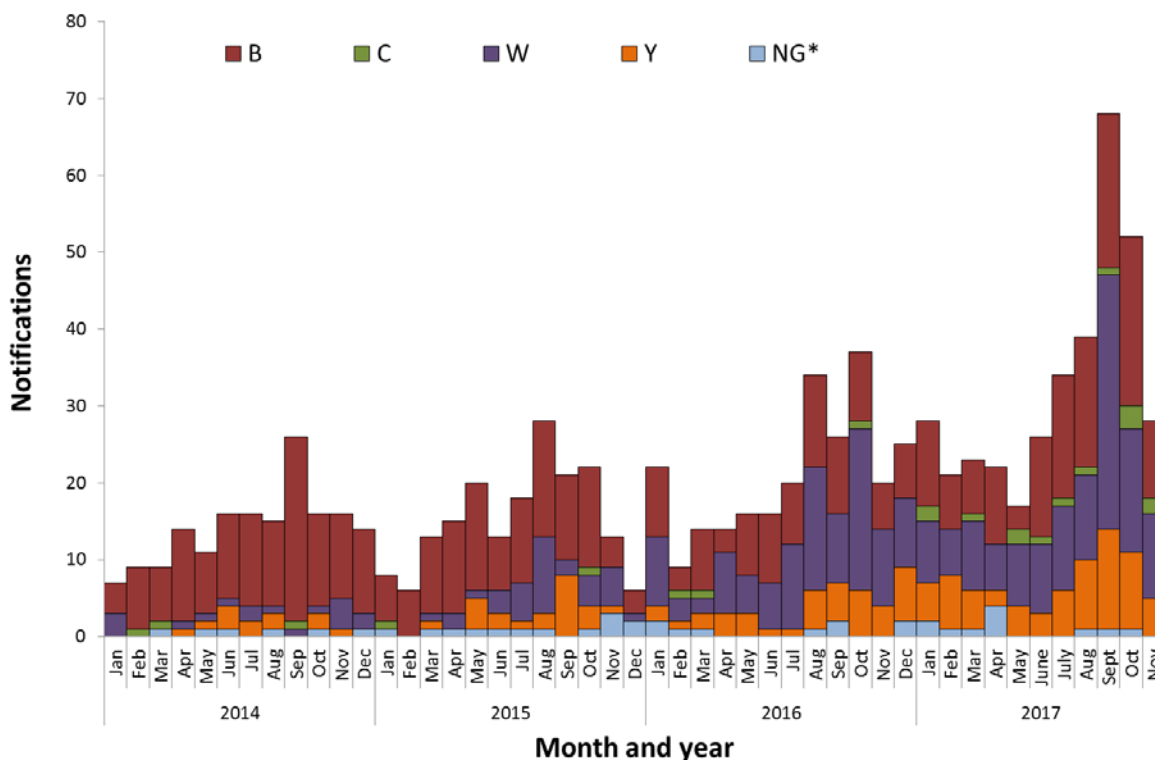
^{*}NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

^yThe rate for 2017 YTD has been annualised.

Seasonality

- IMD tends to follow a seasonal pattern in Australia, with disease activity increasing between June and September each year.
- In 2016, notifications peaked later with 37 cases reported in October. YTD in 2017 notifications have been higher compared to the same months in previous years, with highest number of monthly cases reported in September (n=68) and October (n=52) (Figure 2).

Figure 2. Notifications of IMD, Australia, 2014 to 2017 YTD[#], by month and year of diagnosis and serogroup



[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

Geographical distribution

- So far in 2017, IMD cases were reported across all jurisdictions.
- MenW accounted for 36% (128 cases) of IMD notifications reported YTD in 2017. Across jurisdictions this ranged from 0% in the Australian Capital Territory (ACT) to 82% (n=27) in the Northern Territory (Table 1).
- The highest rate of IMD due to MenW in 2017 YTD is in the Northern Territory with an annualised rate of 12.1 cases per 100,000 population (Table 2).
- YTD in 2017, the Northern Territory reported 33 cases of IMD, compared with 2 cases in 2016, 1 case in 2015 and 3 cases in 2014.

Central Australia MenW outbreak

- In September 2017, the Northern Territory confirmed an outbreak of MenW in the Central Australia, Barkly and Katherine regions.¹
- Cases associated with the outbreak have also been reported in Queensland, South Australia and Western Australia.

Table 1. Notifications and rates of IMD, Australia, 2017 YTD[#] by state and territory and serogroup

State or territory	Notifications								Rate (per 100,000 population)	Annualised Rate (per 100,000 population)
	A	B	C	W	X	Y	NG*	Total		
ACT	0	0	0	0	0	2	0	2	0.5	0.5
NSW	0	43	5	17	0	16	4	85	1.1	1.2
NT	0	3	0	27	0	3	0	33	13.4	14.7
QLD	0	25	0	15	0	20	4	64	1.3	1.4
SA	0	22	0	10	0	3	0	35	2.0	2.2
TAS	0	6	0	8	0	1	1	16	3.1	3.4
VIC	0	25	8	33	0	17	1	84	1.4	1.5
WA	0	12	1	18	0	7	1	39	1.5	1.7
Australia	0	136	14	128	0	69	11	358	1.5	1.6

[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

Table 2. Notifications and rates of MenW, Australia, 2014 to 2017 YTD*, by state and territory

Year	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
	Notifications								
2014	0	7	0	3	0	1	4	2	17
2015	0	8	0	4	0	1	17	4	34
2016	1	25	0	13	5	4	48	12	108
2017 YTD	0	17	27	15	10	8	33	18	128
Rate (per 100,000 population)									
2014	-	0.1	-	0.1	-	0.2	0.1	0.1	0.1
2015	-	0.1	-	0.1	-	0.2	0.3	0.2	0.1
2016	0.2	0.3	-	0.3	0.3	0.8	0.8	0.5	0.4
2017 YTD	0.0	0.2	11.0	0.3	0.6	1.5	0.5	0.7	0.5
2017 annualised rate	0.0	0.2	12.1	1.4	0.6	1.7	0.6	0.8	0.6

[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

Indigenous status

- Between 2014 and 2017 YTD, a total of 117 IMD cases were reported in Aboriginal and Torres Strait Islander peoples (Table 3). MenB accounted for 49% (57/117) of IMD cases reported in Aboriginal and Torres Strait Islander people, followed by MenW with 46% (54/117).
- YTD in 2017, 56 IMD cases were reported in Aboriginal and Torres Strait Islander peoples, of which 73% (41/56) have been due to MenW (Table 4).
- This is in contrast to IMD cases reported from 2014 to 2015, where MenB was the predominant serogroup (95%, 20/21 in 2014 and 73%, 12/16 in 2015). In 2016, there were 24 cases of IMD reported in Aboriginal and Torres Strait Islander peoples. Of these 50% (12/24) were MenB and 42% (10/24) were MenW.
- In 2017 YTD, the annualised rate of MenW reported in Aboriginal and Torres Strait Islander peoples was 6.8 per 100,000 population compared with the annualised rate of 0.4 per 100,000 in non-Indigenous populations (Table 4).

Table 3. Notifications of IMD, Australia, 2014 to 2017 YTD[#] by Indigenous status and serogroup

IMD serogroup	Year	Indigenous	Not Indigenous	Not stated	Total
B	2014	20	109	2	131
	2015	12	97	3	112
	2016	12	80	0	92
	2017 YTD	13	120	3	136
C	2014	0	3	0	3
	2015	0	2	0	2
	2016	0	3	0	3
	2017 YTD	0	13	1	14
W	2014	0	17	0	17
	2015	3	30	1	34
	2016	10	98	0	108
	2017	41	85	2	128
Y	2014	0	12	0	12
	2015	0	22	0	22
	2016	2	38	0	40
	2017 YTD	2	66	1	69
NG*	2014	1	4	0	5
	2015	1	11	0	12
	2016	0	9	0	9
	2017 YTD	0	11	0	11
TOTAL		117	830	13	960

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*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

Table 4. Notifications and rates of IMD, Australia, 2017 YTD[#] by Indigenous status and serogroup

IMD serogroup	Indigenous			Non-Indigenous [^]		
	Notifications	Rate	Annualised	Notifications	Rate	Annualised
		per	rate per		per	rate per
	100,000	100,000		100,000	100,000	
A	0	-	-	0	-	-
B	13	2.0	2.2	123	0.5	0.6
C	0	-	-	14	0.1	0.1
W	41	6.2	6.8	87	0.3	0.4
X	0	-	-	0	-	-
Y	2	0.3	0.3	67	0.3	0.3
NG*	0	-	-	11	0.0	0.1
All IMD	56	8.5	9.3	302	1.3	1.4

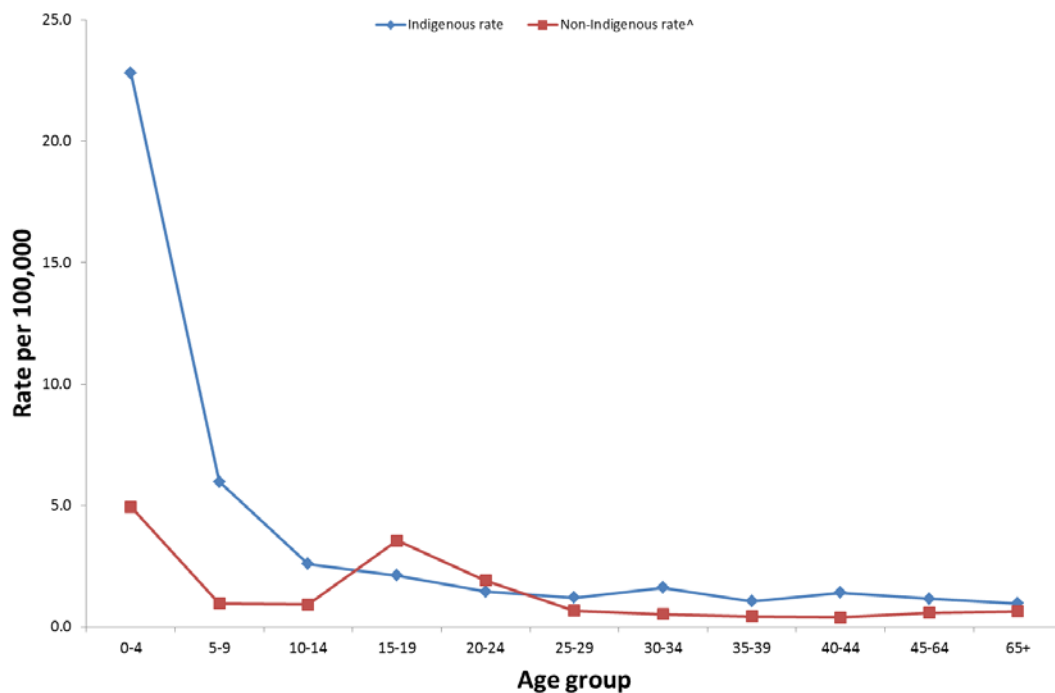
[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

[^]Non-Indigenous includes case reported as non-Indigenous and not stated.

- Since 2002, the notification rates of IMD were higher in Aboriginal and Torres Strait Islander peoples aged 0-4 years (22.8 per 100,000) and 5-9 years (6.0 per 100,000) compared to those who reported as non-Indigenous; 4.9 per 100,000 and 1.0 per 100,000 respectively (Figure 3).

Figure 3. Notification rates of IMD, Australia, 2002 to 2017 YTD[#], by Indigenous status and age group



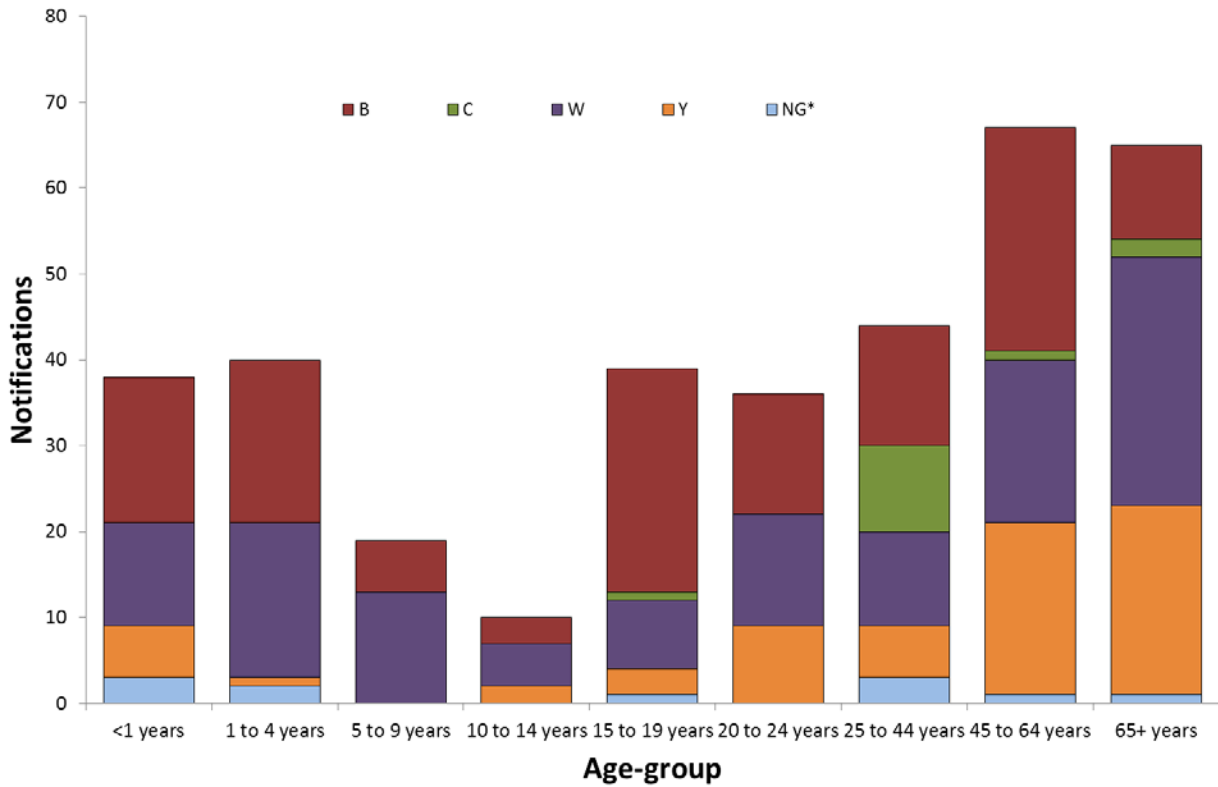
[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

[^]Non-Indigenous includes case reported as non-Indigenous and not stated.

Age distribution

- So far in 2017, MenW has been reported in all age groups. This includes 12 cases for infants less than 1 year, 18 cases in the 1-4 years age group, 13 cases in the 5-9 years age group, 5 cases in the 10-14 years age group, 8 cases in the 15-19 years age group, 13 cases in the 20-24 years age group, 11 cases in the 25-44 years age group, 19 cases in the 45-64 age group and 29 cases in the 65 and older age group (Figure 4).
- In 2017 YTD, 63% (80/128) of MenW notifications were aged less than 45 years. This is slightly higher than the age distribution seen in 2016, with 54% of MenW notifications aged less than 45 years.
- For MenY notifications 61% (42/69) have been in people aged 45 years or older, compared with 2015 (77%, 17/22) and 2016 (63%, 25/40).
- Age-specific rates of MenW, while remaining low, have increased in most age groups since 2012. The 2017 annualised notification rates for IMD exceed the 2016 rates in all age groups except the 15-19 years and 25-44 years age groups (Figure 5).

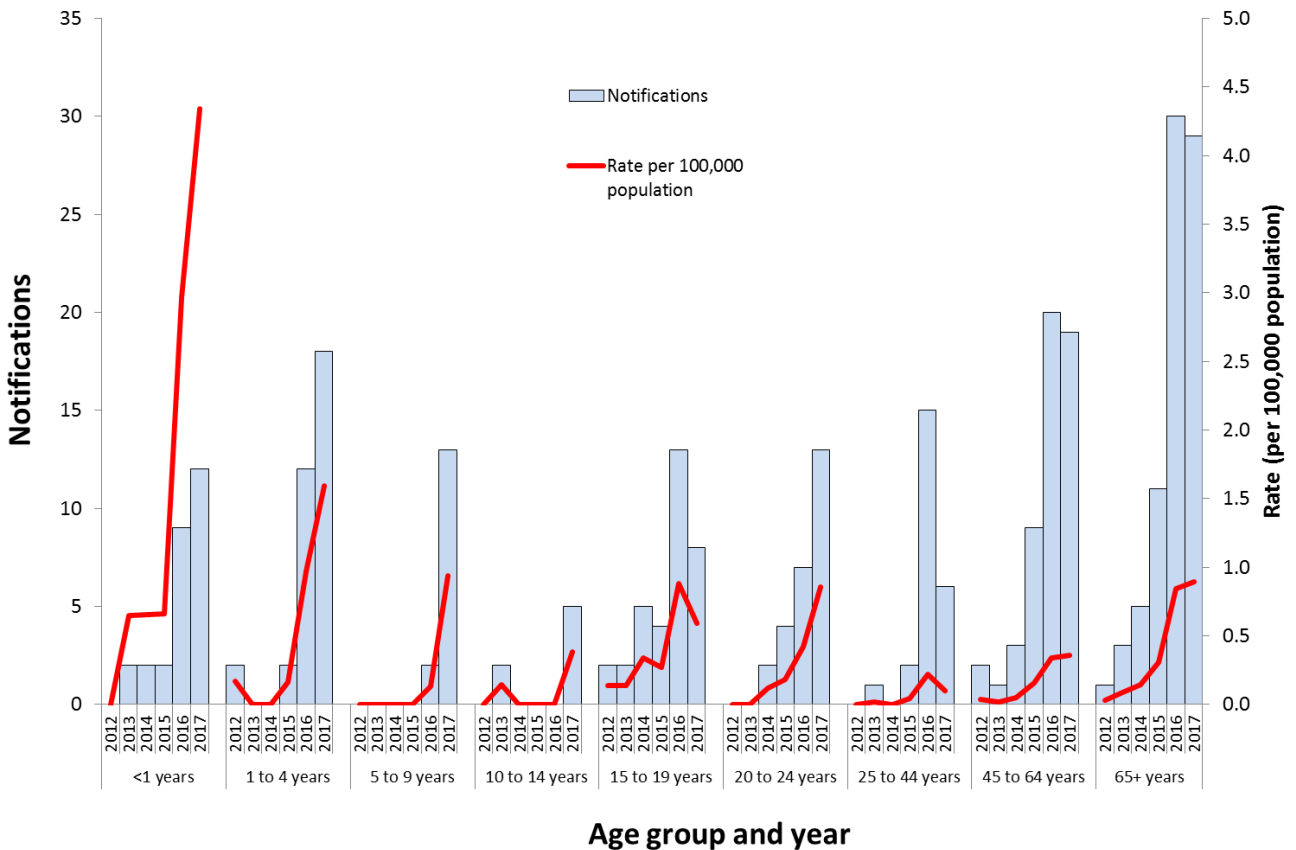
Figure 4. Notifications of IMD, Australia, 2017 YTD[#], by specified age group and serogroup



[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

Figure 5. Age-specific notifications and rates[†] of MenW, Australia, 2012 to 2017 YTD[#]



[†]The rate for 2017 YTD was annualised.

[#]Data from the NNDSS with a diagnosis date up until of 30 November 2017. Data was extracted on 12 December 2017.

Clinical presentation and severity

- In 2017 YTD, there have been 25 deaths reported; 8 due to MenB, 14 due to MenW, 2 due to MenY and 1 due to MenC.
- Fourteen of the 23 deaths due to IMD in Australia in 2015 and 2016 were due to MenW. The average case fatality rate (CFR) for MenW between 2007 and 2016 (6.5%) was greater than the CFR due to MenB and MenY (3.3%). In 2017 YTD, the CFR for MenW was 10.9% (14/128).
- The mortality reporting against each notification of IMD is not complete, but has improved over time.
- Many MenW strains identified in Australia belong to the hypervirulent sequence type ST 11, which is part of the clonal complex 11 (CC 11). This was verified by the enhanced data collected in January 2017 for the cases reported in 2016. Of the 108 cases of MenW reported in 2016, 98 isolates had sufficient fine typing information. The majority of the MenW CC 11 isolates were ST 11 (70 of 98 isolates).
- Of the 101 MenW case reported from the first to the third quarter of 2017 (1 January to 30 September), 89 isolates had sufficient typing information. The majority of MenW C11 isolates were ST 11 (63 of 89 isolates).
- ST 11 strains are associated with a high case fatality and atypical clinical presentation, making early diagnosis challenging.²
- Non-specific presentation is not uncommon for IMD, which can also make early diagnosis challenging.

Background

- Invasive Meningococcal Disease (IMD), manifests as meningitis, sepsis or bacteraemia and mainly affects children aged less than 5 years and adolescents (15-19 years) with a seasonal peak of cases in winter and early spring.
- The clinical manifestations of meningococcal septicaemia and meningitis may be non-specific and can include sudden onset of fever, rash (petechial, purpuric or maculopapular), headache, neck stiffness, photophobia, altered consciousness, muscle ache, cold hands, thirst, joint pain, nausea and vomiting.
- Meningococcal infections can progress rapidly to serious disease or death in previously healthy persons. A number of medical conditions are known to increase the risk of an individual developing IMD. People who survive infection can develop permanent sequelae, including limb deformity, skin scarring, deafness and neurologic deficits.
- The bacteria causing this disease, *Neisseria meningitidis*, is carried by a proportion of the population without developing disease. The prevalence and duration of asymptomatic nasopharyngeal carriage of meningococci vary over time and in different population and age groups. Adolescents have the highest carriage rates, peaking in 19-year olds, and so play an important role in transmission.³
- Vaccination against meningococcal disease in Australia has been targeted at MenC and is given to children at 12 months of age.

Source

- Data extracted from the NNDSS on 12 December 2017.
- Line-listed de-identified enhanced data on 529 IMD cases from 1 January 2016 to 30 September 2017 were collected by excel spreadsheet from all states and territories. Enhanced fields included fine typing information.

- Due to the dynamic nature of the NNDSS, data in 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.
- Data extracted by diagnosis date.

REFERENCES

- ¹ Northern Territory Government, 2017. Health Alert: Meningococcal outbreak in Central Australia. available at: <http://mediareleases.nt.gov.au/mediaRelease/23733>
- ² Mustapha, M. M. et al. 2016. Global epidemiology of capsular group W meningococcal disease(1970–2015): Multifocal emergence and persistence of hypervirulent sequence type (ST)-11 clonal complex. *Vaccine* 34 (13): 1515-1523.
- ³ Christensen H. et al. 2010. Meningococcal carriage by age: a systematic review and meta-analysis. *Lancet Infectious Diseases Dec 2010: 853-61.*