



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 and 2017, MenW became the predominant meningococcal serogroup in Australia with a total of 108 cases and 141 cases respectively, reported to the National Notifiable Diseases Surveillance System (NNDSS).
- In 2018 year-to-date (YTD), a total of 20 cases of IMD have been reported to the NNDSS. Of these, 12 cases were due to MenB, three cases were due to MenW, four cases were due to serogroup Y (MenY) and one case is yet to be classified.
- YTD in 2018, MenW cases have been reported in Victoria (n=1) and Western Australia (n=2).
- In 2018, YTD, a total of four IMD cases have been reported in Aboriginal and Torres Strait Islander peoples. Of these, two cases were due to MenB, one case due to MenW and one case is yet to be classified.
- IMD follows a seasonal trend in Australia with notifications usually peaking in winter and early spring.
- 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). ST 11 is associated with a higher risk of invasive disease and a higher case fatality rate. In 2017, there were 16 deaths due to MenW, all of which were CC 11.
- Also of interest is the increase in MenY notifications, which is accounting for an increasing proportion of cases since 2011. A total of 75 cases of MenY were reported in 2017, accounting for 19% of notifications, compared with 40 cases (17%) in 2016, 22 cases (12%) in 2015 and 12 cases (7%) in 2014.

ANALYSIS

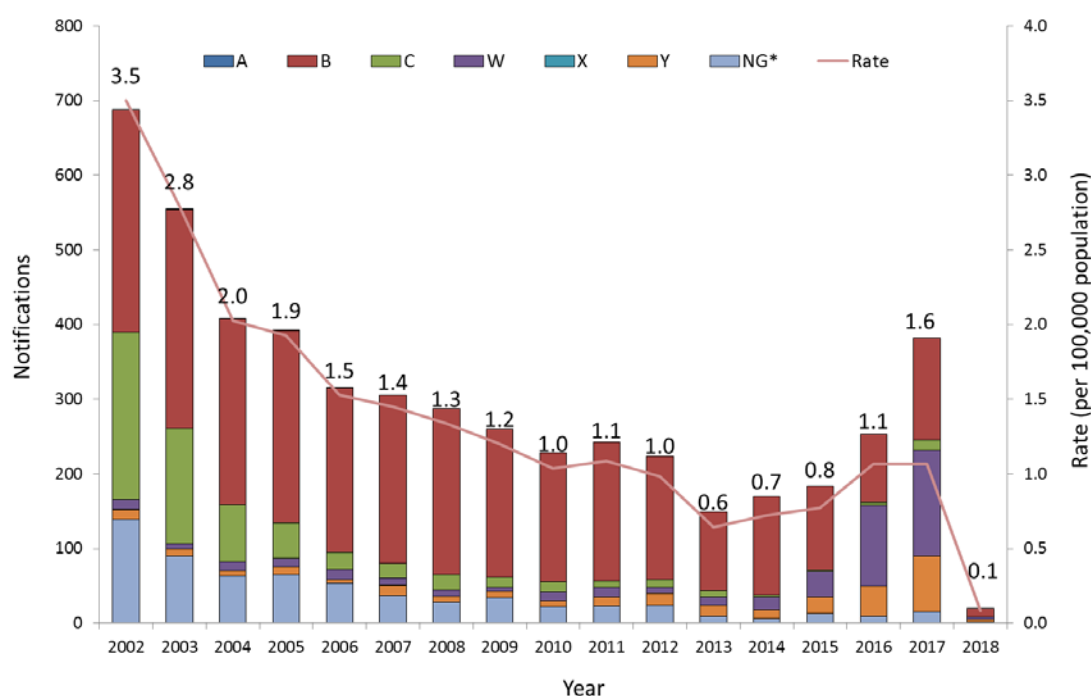
Serogroup trends

- 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 (n=685) in 2002 to 0.6 per 100,000 (147 cases) in 2013 (Figure 1).
- Since 2013, the overall rate of IMD has increased in Australia, with 2017 displaying the highest rate (1.6 per 100,000) since 2006. YTD in 2018, there have been 20 cases of IMD, representing a notification rate of 0.1 per 100,000 population.
- The four most common meningococcal serogroups in Australia are B, C, W and Y. Between 2002 to 2015 meningococcal B was the most predominant serogroup in Australia. However from 2016 there has been a shift in meningococcal serogroups in Australia, with more cases caused by MenW and MenY.
 - From 2002 to 2015 MenB, accounted for between 43% and 78% of notifications annually. In 2017 there were 137 cases of MenB, a 48% increase on the number of cases notified to

the NNDSS in 2016 (n=92). So far in 2018, 60% of IMD cases (n=12) notified to the NNDSS are MenB.

- MenC, the target of a national immunisation program since 2003, has dramatically declined from 225 cases in 2002 to three cases in 2016 (a 99% decline). In 2017 there were 14 cases of MenC. The majority of these cases (71%, 10/14) were not eligible for the funded MenC vaccine. YTD in 2018, there have been no cases of MenC reported to the NNDSS.
- Cases of MenW have been increasing since 2013 with case numbers 7.3 times higher in 2017 (n=141) compared to 2014 (n=17). In 2018 YTD, MenW cases accounted for 15% (n=3) of IMD cases reported to the NNDSS.
- Annual cases of MenY have ranged from 5 to 40 since 2002, with an increasing trend since 2011. In 2017 there were 75 cases of MenY reported to the NNDSS, compared with 40 cases in 2016 and 22 cases in 2015. YTD in 2018, four MenY cases have been notified to the NNDSS, accounting for 20% 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 2018 YTD.

Figure 1. Notifications and rates of IMD, Australia, 2002 to 2018 YTD[#], by serogroup



[#] Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

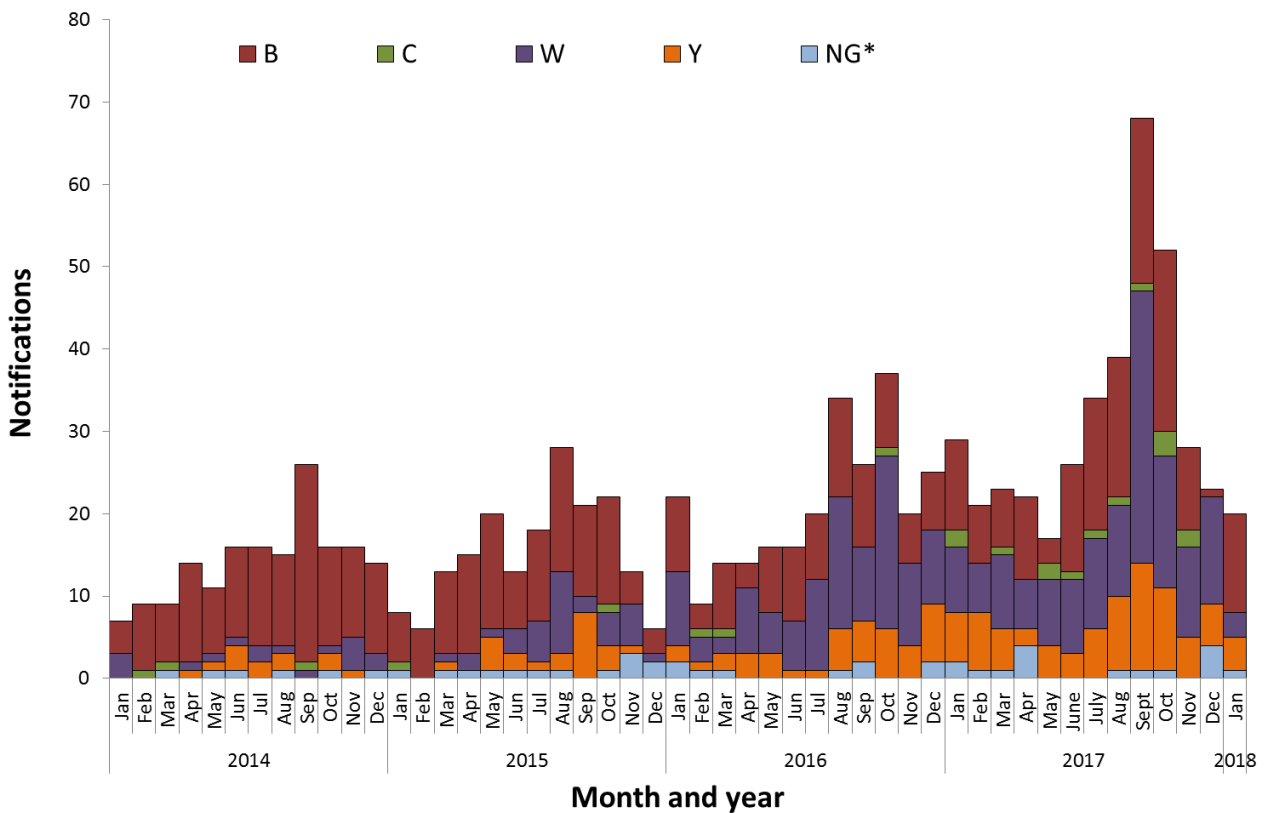
*NG includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.

Seasonality

- IMD tends to follow a seasonal pattern in Australia, with disease activity increasing between June and September each year.
- Whilst in 2016, this seasonal trend shifted slightly with notifications peaking in October (n=37), in 2017 notifications peaked in September (n=68), returning to the previously seen seasonal trend of IMD (Figure 2).

- The number of cases reported YTD in 2018 (20 cases), were less than the number of cases reported in the same period for 2017 (29 cases), but similar to the numbers reported in 2016 (22 cases).

Figure 2. Notifications of IMD, Australia, 2014 to 2018 YTD[#], by month and year of diagnosis and serogroup



[#]Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

*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 2018, IMD cases have been notified in all jurisdictions except the Australian Capital Territory and Tasmania.
- MenW accounted for 15% (3 cases) of IMD notifications reported YTD in 2018, with cases reported from Victoria and Western Australia (Table 1).
- The highest rate of IMD due to MenW in 2018 YTD was in Western Australia, with a rate of 0.08 cases per 100,000 population (Table 2).

Central Australia MenW outbreak

- On 25 September 2017, the Northern Territory confirmed an outbreak of MenW in the Central Australia, Barkly and Katherine regions.¹
- Cases associated with the outbreak were also reported in Queensland, South Australia and Western Australia.
- There were 32 cases associated with this outbreak with the majority of cases reported in the Northern Territory (n=27). All cases associated with this outbreak identified as Aboriginal and the median age of cases was 5 years (range 0-47 years).

Table 1. Notifications and rates of IMD, Australia, 2018 YTD[#] by state and territory and serogroup

State or territory	Notifications								Rate (per 100,000 population)
	A	B	C	W	X	Y	NG*	Total	
ACT	0	0	0	0	0	0	0	0	0.0
NSW	0	3	0	0	0	2	0	5	0.1
NT	0	0	0	0	0	0	1	1	0.4
QLD	0	5	0	0	0	1	0	6	0.1
SA	0	2	0	0	0	0	0	2	0.1
TAS	0	0	0	0	0	0	0	0	0.0
VIC	0	0	0	1	0	1	0	2	0.0
WA	0	2	0	2	0	0	0	4	0.2
Australia	0	12	0	3	0	4	1	20	0.1

[#]Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

*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 2018 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	0	19	28	16	11	8	36	23	141
2018 YTD	0	0	0	0	0	0	1	2	3
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	-	0.2	11.4	0.3	0.6	1.5	0.6	0.9	0.6
2018 YTD	-	-	-	-	-	-	0.02	0.08	-

[#]Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

Indigenous status

- Between 2014 and 2018 YTD, a total of 126 IMD cases were reported in Aboriginal and Torres Strait Islander peoples (Table 3). Of these, MenB accounted for 47% (59/126) of IMD cases followed by MenW with 48% (60/126).
- YTD in 2018, four IMD cases were reported in Aboriginal and Torres Strait Islander peoples, of which 25% (1/4) were due to MenW (Table 4).
- From 2014 to 2015, MenB was the predominant serogroup (95%, 20/21 in 2014 and 73%, 12/16 in 2015) in reported in Aboriginal and Torres Strait Islander peoples. However in 2016, this changed with 50% (12/24) of all IMD reported in Aboriginal and Torres Strait Islander peoples due to MenB and 42% (10/24) due to MenW. In 2017, MenW became the predominate serogroup reported in Aboriginal and Torres Strait Islander peoples with 75% (46/61) of cases.
- In 2018 YTD, the rate of MenW reported in Aboriginal and Torres Strait Islander peoples was 0.6 per 100,000 population compared with the rate of 0.1 per 100,000 in non-Indigenous populations (Table 4).

Table 3. Notifications of IMD, Australia, 2014 to 2018 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	13	121	3	137
	2018 TYD	2	9	1	12
C	2014	0	3	0	3
	2015	0	2	0	2
	2016	0	3	0	3
	2017	0	14	0	14
	2018 TYD	0	0	0	0
W	2014	0	17	0	17
	2015	3	30	1	34
	2016	10	98	0	108
	2017	46	93	2	141
	2018 TYD	1	2	0	3
Y	2014	0	12	0	12
	2015	0	22	0	22
	2016	2	38	0	40
	2017	2	72	1	75
	2018 TYD	0	3	1	4
NG*	2014	1	4	0	5
	2015	1	11	0	12
	2016	0	9	0	9
	2017	0	15	0	15
	2018 TYD	1	0	0	1
TOTAL		126	864	14	1,004

[#] Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

*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, 2018 YTD[#] by Indigenous status and serogroup

IMD serogroup	Indigenous		Non-Indigenous [^]	
	Notifications	Rate per 100,000	Notifications	Rate per 100,000
A	0	-	0	-
B	2	0.3	10	0.0
C	0	-	0	-
W	1	0.2	2	0.0
X	0	-	0	-
Y	0	-	4	0.0
NG*	1	0.2	0	-
All IMD	4	0.6	16	0.1

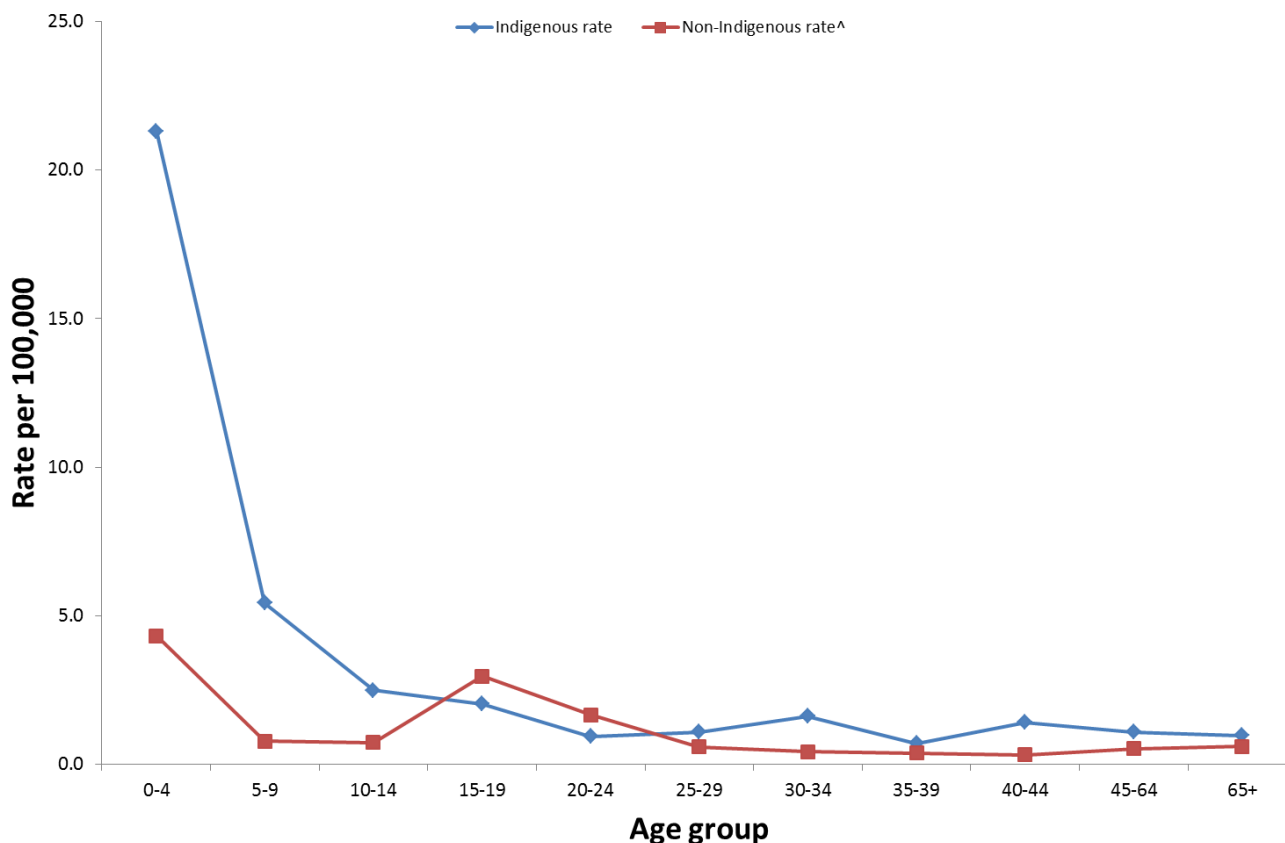
[#] Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

*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 (21.3 per 100,000) and 5-9 years (5.4 per 100,000) compared to those who reported as non-Indigenous; 4.3 per 100,000 and 0.8 per 100,000 respectively (Figure 3).

Figure 3. Notification rates of IMD, Australia, 2002 to 2018 YTD[#], by Indigenous status and age group



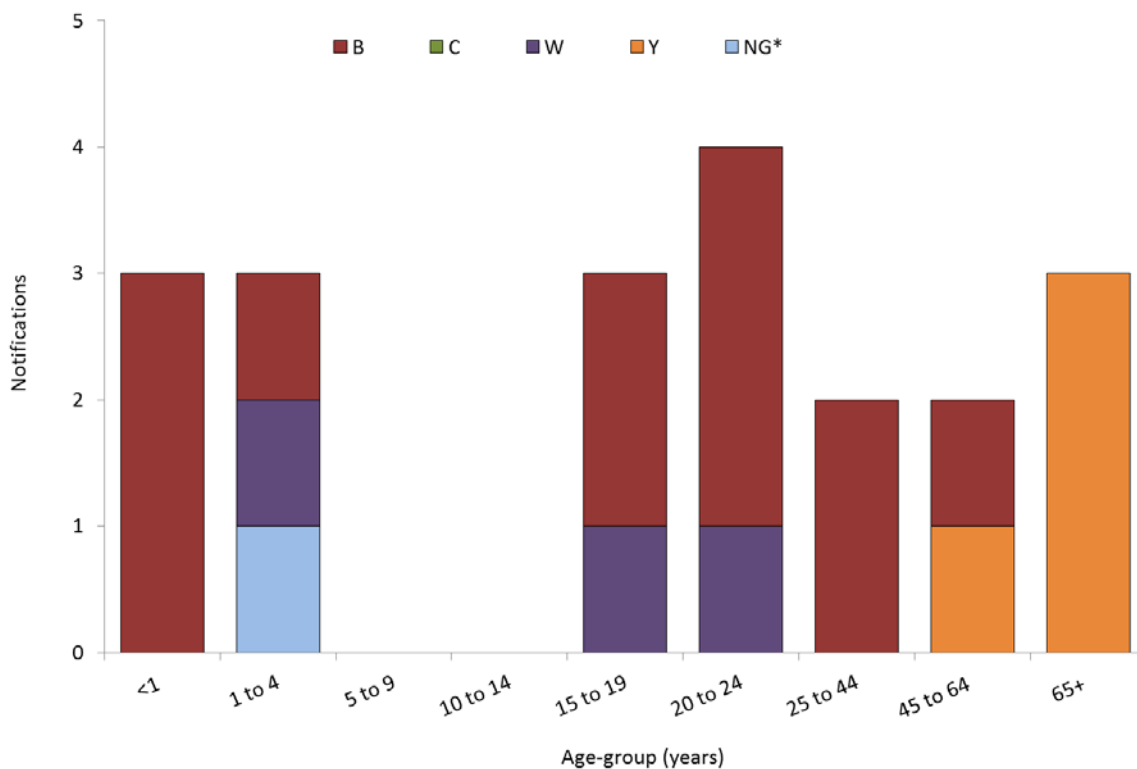
[#] Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

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

Age distribution

- So far in 2018, there has been one case of MenW reported in each of the following age groups: 1 to 4 years, 15 to 19 years and 20 to 24 years age groups (Figure 4).
- For MenY, all cases reported YTD in 2018 have been in people aged 45 years or older.
- Age-specific rates of MenW, while remaining low, have increased in most age groups since 2012. The 2017 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). YTD in 2018, no age specific notification rates exceed the 2017.

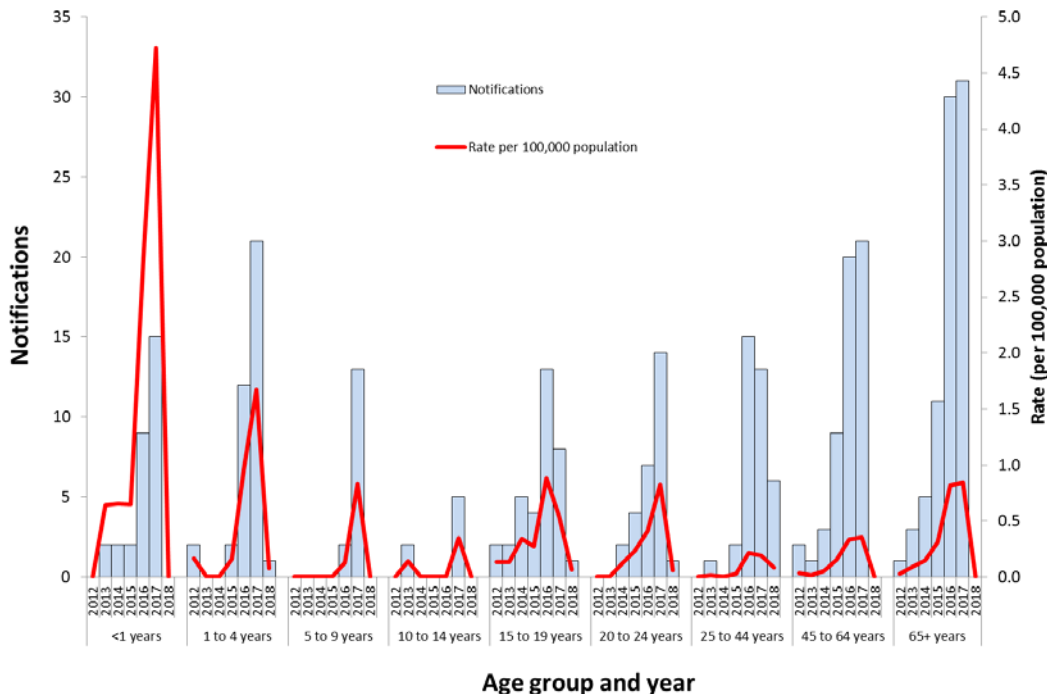
Figure 4. Notifications of IMD, Australia, 2018 YTD[#], by specified age group and serogroup



[#] Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

*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 2018 YTD[#]



[#] Data from the NNDSS with a diagnosis date up until of 31 January 2018. Data was extracted on 19 February 2018.

Clinical presentation and severity

- In 2018 YTD, there have been no deaths reported due to IMD. In 2017, there were 28 deaths reported; 16 due to MenW, 8 due to MenB, 3 due to MenY and 1 due to MenC.
- Fifty-nine percent (30/51) of IMD associated deaths in Australia between 2015 and 2017 were due to MenW. The case fatality rate (CFR) for MenW between 2008 and 2017 was 9.3%, which was greater than the CFR due to MenB and MenY at 5%.

- 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 19 February 2018.
- 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: 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.*