Australian Government
Department of Health

INVASIVE MENINGOCOCCAL DISEASE NATIONAL SURVEILLANCE REPORT

With a focus on MenW

14 August 2017

SUMMARY

- The number of cases of invasive meningococcal disease (IMD) and overall risk remains low; however, since 2013, serogroup W (MenW) has emerged as a significant 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 109 cases reported to the National Notifiable Diseases Surveillance System (NNDSS).
- In 2017 year-to-date (YTD), a total of 182 cases of IMD have been reported to the NNDSS. Of these, 69 cases were due to MenB, 55 cases were due to MenW, 35 cases were due to serogroup Y (MenY), 8 cases were due to serogroup C (MenC) and the serogroup for the remaining 15 cases is pending or unknown.
- So far in 2017, MenW cases have been reported across all jurisdictions, except the Australian Capital Territory.
- In 2017 YTD, a total of 18 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples. Of these, 9 cases were due to MenB, 6 cases were due to MenW, 2 cases were due to MenY and 1 case was reported as pending or unknown.
- IMD follows a seasonal trend in Australia with notifications usually peaking in winter and early spring. In 2016, notifications peaked later, with 34 cases in August and 37 cases in October. IMD notifications reported between December 2016 and August 2017 were also high when compared to the same months in previous years.
- While cases of MenW are more common in adults, there has been an increase in cases in children aged less than 5 years since 2015.
- Many of the MenW cases belong to the hypervirulent sequence type (ST) 11, which is part of the ST 11 clonal complex (CC 11). ST 11 is associated with a higher risk of invasive disease and a higher case fatality rate. Three deaths have occurred in 2017 YTD due to MenW.
- Also of interest is the increase in MenY notifications, which is accounting for a larger proportion of cases since from 2011. A total of 35 cases of MenY have been reported in 2017 YTD, accounting for 19% of notifications.

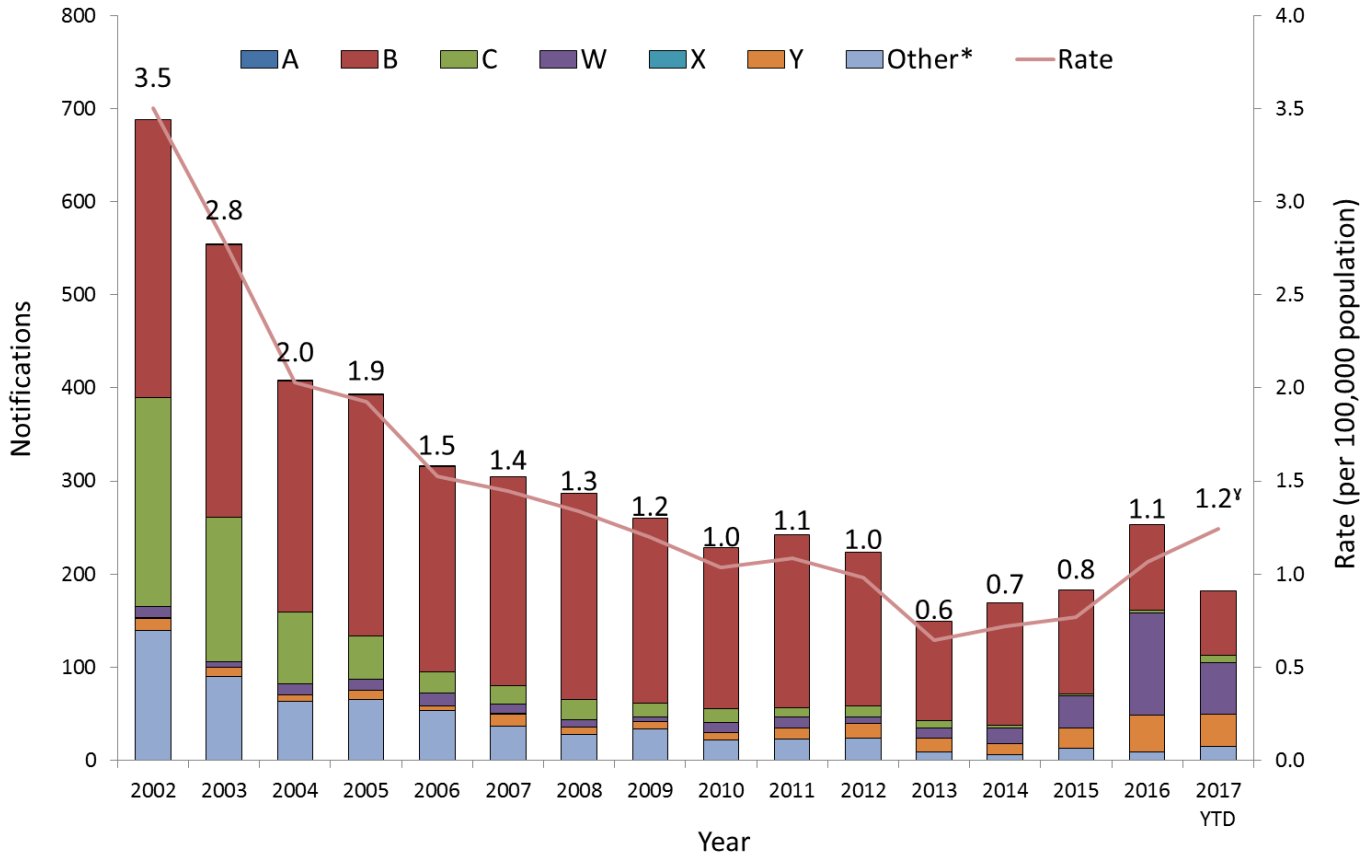
ANALYSIS

Serogroup trends

- Overall there has been a decline in IMD cases since the 2003 introduction of the MenC vaccine on the National Immunisation Program (NIP) with the overall rate of IMD decreasing 82% from 3.5 per 100,000 (688 cases) in 2002 to 0.6 per 100,000 (149 cases) in 2013. However, from 2014 the overall rate of IMD has increased. In 2017 YTD, there have been a total of 182 cases of IMD (0.7 per 100,000 (annualised rate 1.2 per 100,000) compared to 253 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. Over this time, MenB notifications declined despite a targeted vaccine not being available on the NIP. So far in 2017, 38% of IMD cases (n=69) notified to the NNDSS are MenB.

- MenC, the target of a national immunisation programme since 2003, has dramatically declined from 225 notifications in 2002 to 3 notifications in 2016 (a 99% decline). So far in 2017, 8 MenC cases have been notified to the NNDSS, one of which was acquired overseas.
- Notifications of MenW doubled from 2014 (17) to 2015 (34), then more than tripled in 2016 (109). In 2017 YTD, 30% of IMD cases (n=55) 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 to 22 and 12 in 2015 and 2014, respectively. In 2017 YTD, 35 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.

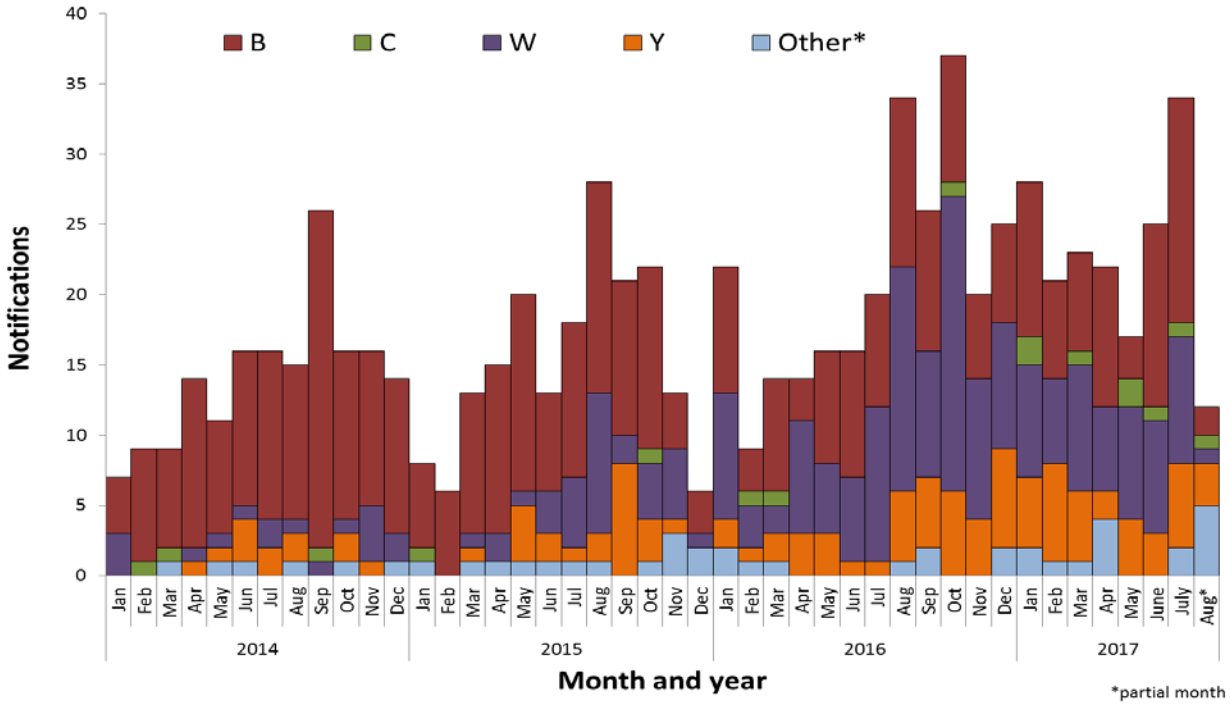
Figure 1. Notifications and rates of IMD, Australia, 2002 to 2017 YTD[#], by serogroup



[#]Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.
**Other includes where meningococcal isolates could not be identified ('not groupable'), other isolates not grouped and where serogroup was not known.*
[ˠ] The rate for 2017 YTD has been annualised.

- 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 34 cases in August and 37 cases in October. IMD notifications in 2017 YTD were higher when compared to the same months in previous years (Figure 2).

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



[#]*Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.*

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

Geographical distribution

- MenW accounted for 30% (55 cases) of notifications of IMD reported in 2017 YTD. Across jurisdictions this ranged from 0% in the Australian Capital Territory (ACT) to 71% (n=5) in Tasmania (Table 1).

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	Other*	**Total**		
ACT	0	0	0	0	0	0	0	0	0.0	-
NSW	0	24	3	8	0	6	8	49	0.6	1.0
NT	0	1	0	2	0	1	1	5	2.0	3.3
QLD	0	13	0	9	0	15	4	41	0.9	1.4
SA	0	14	0	5	0	2	0	21	1.2	2.0
TAS	0	2	0	5	0	0	0	7	1.4	2.2
VIC	0	11	4	19	0	9	1	44	0.7	1.2
WA	0	4	1	7	0	2	1	15	0.6	0.9
Australia	0	69	8	55	0	35	15	182	0.8	1.2

[#]*Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.*

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

- The highest rate of IMD due to MenW in 2017 YTD has been reported in Tasmania with an annualised rate of 1.6 cases per 100,000 population (Table 2).

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	26	0	13	5	4	48	12	**109**
2017 YTD	0	8	2	9	5	5	19	7	55
	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	0.3	0.3	-	0.3	0.3	0.8	0.8	0.5	**0.5**
	0.0	**0.1**	**0.8**	**0.2**	**0.3**	**1.0**	**0.3**	**0.3**	**0.2**
2017 annualised rate	**0.0**	**0.2**	**1.3**	**0.3**	**0.5**	**1.6**	**0.5**	**0.4**	**0.4**

**Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.*

Indigenous status

- Between 2014 and 2017 YTD, a total of 79 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples (Table 3). The majority (67%, 53/79) of IMD cases reported in Aboriginal and Torres Strait Islander peoples were due to MenB.

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	-	92
	2017 YTD	9	60	-	69
C	2014	-	3	-	3
	2015	-	2	-	2
	2016	-	3	-	3
	2017 YTD	-	8	-	8
W	2014	-	17	-	17
	2015	3	30	1	34
	2016	10	98	-	108
	2017	6	48	1	55
Y	2014	-	12	-	12
	2015	-	22	-	22
	2016	2	38	-	40
	2017 YTD	2	33	-	35
Other*	2014	1	4	-	5
	2015	1	11	-	12
	2016	-	9	-	9
	2017 YTD	1	14	-	15
TOTAL		**79**	**698**	**7**	**784**

[#]Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.

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

- In 2017 YTD, a total of 18 IMD cases have been reported in Aboriginal and Torres Strait Islander peoples (annualised rate = 4.4 per 100,000 population), compared to 164 cases reported in non-Indigenous populations (annualised rate = 1.1 per 100,000). Of the 18 IMD cases reported in Aboriginal and Torres Strait Islander peoples, 9 cases were due to MenB, 6 cases were due to MenW, 2 cases were due to MenY and 1 case was reported as other (Table 4).

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

	Indigenous			Non-Indigenous		
IMD serogroup	Notifications	Rate per 100,000	Annualised rate per 100,000	Notifications	Rate per 100,000	Annualised rate per 100,000
A	0	-	-	0	-	-
B	9	1.4	2.2	60	0.3	0.4
C	0	-	-	8	0.0	0.1
W	6	0.9	1.5	49	0.2	0.3
X	0	-	-	0	-	-
Y	2	0.3	0.5	33	0.1	0.2
Other*	1	0.2	0.2	14	0.1	0.1
Total	18	2.7	4.4	164	0.7	1.1

[#]Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.

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

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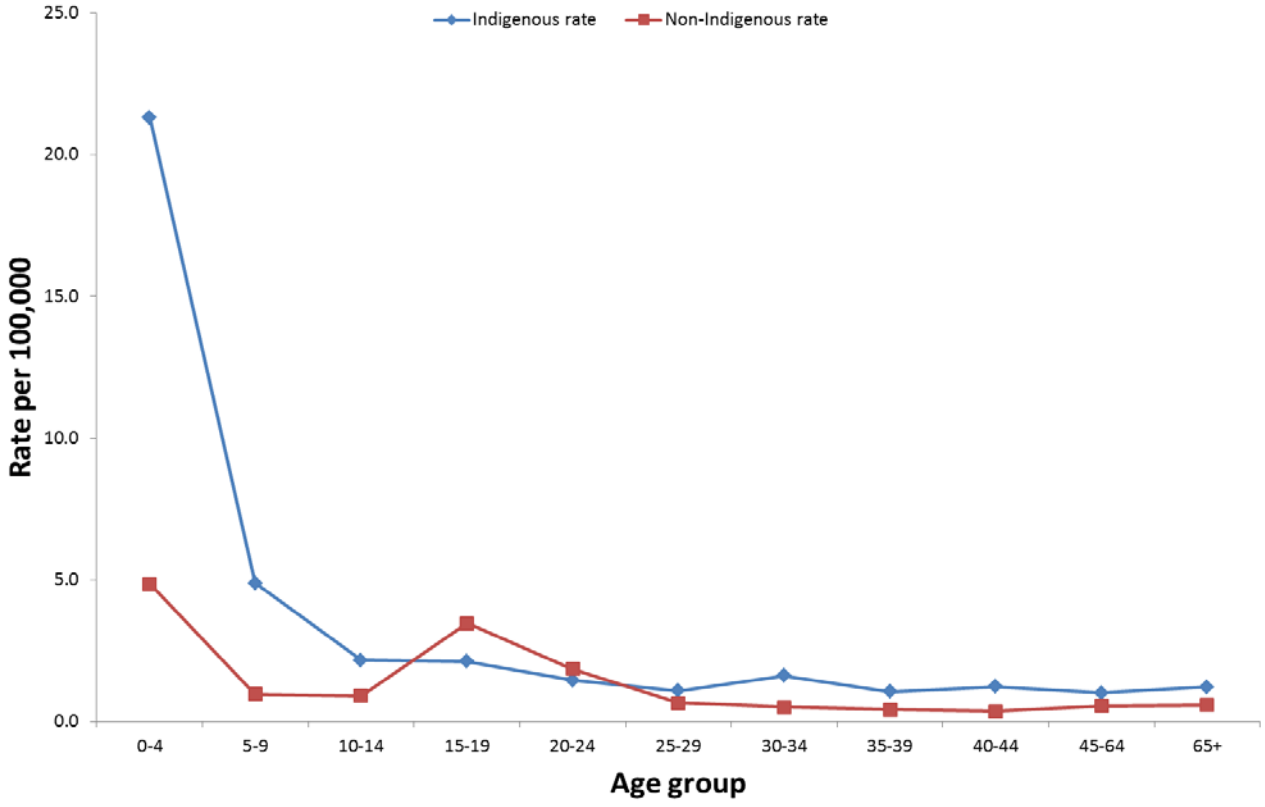
- Since 2002, the notification rates of IMD have been higher in Aboriginal and Torres Strait Islander peoples aged 0-4 years (21.3 per 100,000) and 5-9 years (4.9 per 100,000) compared to those who reported as non-Indigenous; 4.9 per 100,000 and 1.0 per 100,000 respectively (Figure 3).

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

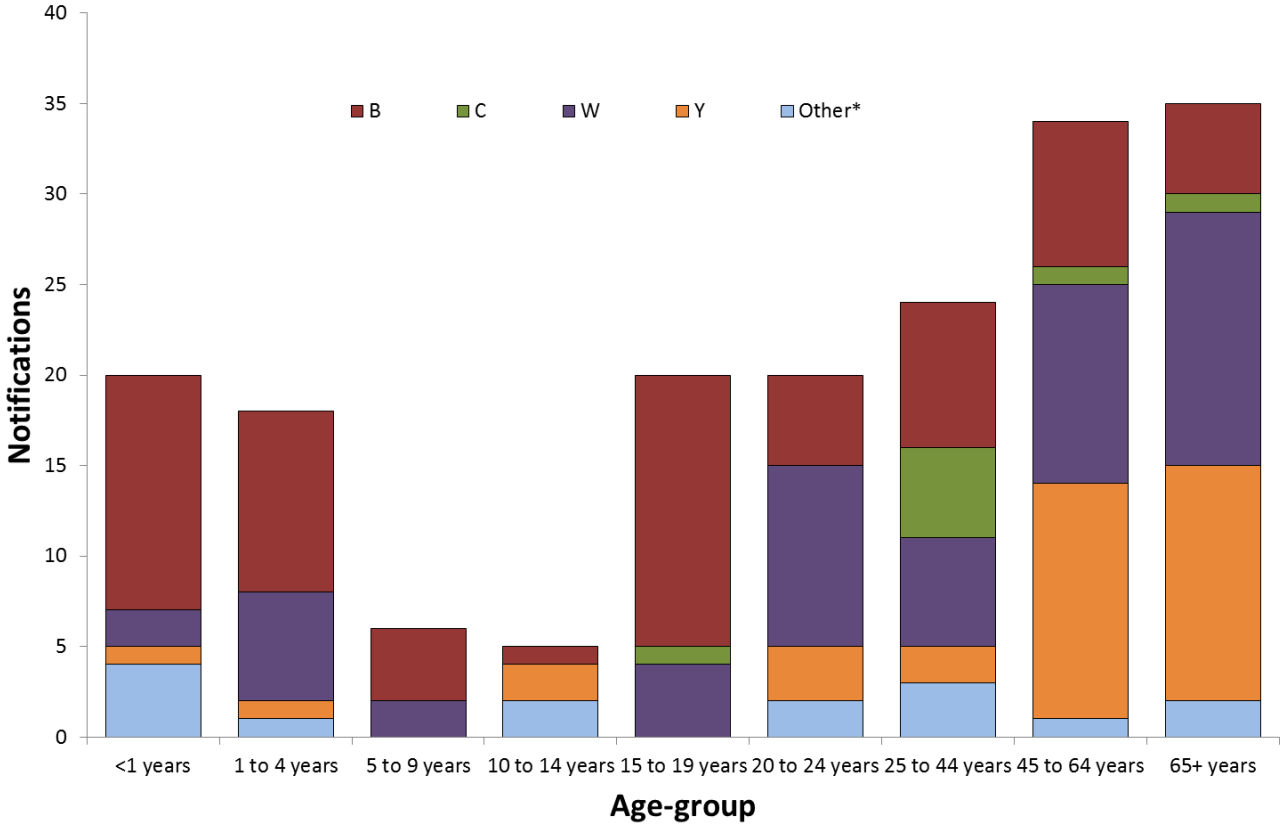


[#]Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.

Age distribution

- So far in 2017, MenW has been reported in the following age groups, less than 1 year (n=2), 1-4 years (n=6), 5-9 years (n=2), 15-19 years (n=4), 20-24 years (n=10), 25-44 years (n=6), 45-64 (n=11) and 65 and over (n=14) (Figure 4).
- In 2017 YTD, 45% (25/55) of MenW notifications and 74% (26/35) of MenY notifications have been in people 45 years and older. For MenW this is a similar distribution of notifications in 2016 with 46% (50/109), but higher for MenY with 63% (25/40) of notifications reported for this age group in 2016.

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



[#]Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.
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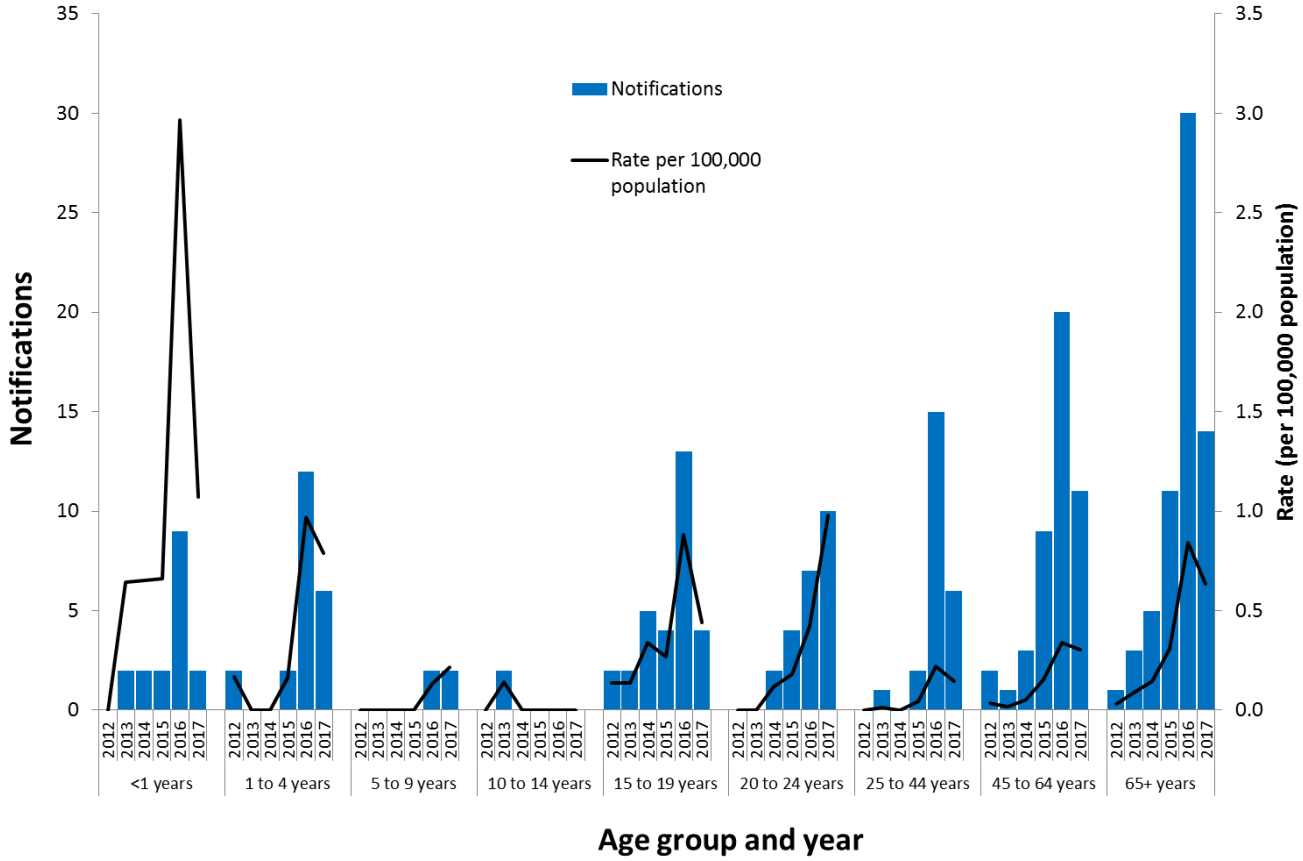
- Age-specific rates of MenW, while remaining low, have increased in most age groups since 2012. The 2017 annualised notification rates for IMD are exceeding the 2016 rates in the 5 to 9 years and 20 to 24 years age groups (Figure 5).

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



[ɣ]2017 rates are annualised.
[#]Data extracted from the National Notifiable Diseases Surveillance System on 14 August 2017.

Clinical presentation and severity

- In 2017 YTD, there have been 9 deaths reported; 4 due to MenB, 3 due to MenW, 1 due to MenC and 1 due to MenY.
- Many MenW strains identified in Australia belong to the hypervirulent sequence type ST 11, which is part of the ST 11 clonal complex (CC 11). This was verified by the enhanced data collected in January 2017 for 237 of the 259 IMD cases reported in 2016. Of the 110 cases of MenW reported in 2016, 69 isolates had sufficient fine typing information. The majority of the MenW CC 11 isolates were ST 11 (35 of 69 isolates).
- Of the 23 MenW case reported in the first quarter of 2017 (1 January to 30 April), 14 isolates had sufficient typing information. The majority of the MenW C11 isolates were ST 11 (10 of 14 isolates).
- ST 11 strains are associated with a high case fatality and atypical clinical presentation, making early diagnosis challenging.[1]
- Non-specific presentation is not uncommon for IMD, which can also make early diagnosis challenging.
- 14 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 (8%) is greater the CFR of IMD due to all other serogroups (5%). In 2017 YTD, the CFR for MenW is 6% (3/55).
- It is important to note that mortality reporting against each notification of IMD is not complete, but has improved over time.

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.[2]
- 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 14 August 2017.
- Line-listed de-identified enhanced data on 237 IMD cases from 1 January 2016 to 16 January 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 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*.

2 Christensen H. et al. 2010. Meningococcal carriage by age: a systematic review and meta-analysis. *Lancet Infectious Diseases Dec 2010: 853-61.*