



## SUMMARY

- Nationally the number of invasive meningococcal disease (IMD) cases and overall risk remains low; however, since 2013, serogroup W (MenW) and more recently serogroup Y (MenY) have emerged as significant causes 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 139 cases respectively, reported to the National Notifiable Diseases Surveillance System (NNDSS).
- In 2018 year-to-date (YTD), a total of 53 cases of IMD have been reported to the NNDSS. Of these, 24 cases were due to MenB, 14 cases were due to serogroup Y (MenY), 10 cases were due to MenW, two cases were due to serogroup C (MenC) and three cases are yet to be classified.
- YTD in 2018, MenW cases have been reported in the Australian Capital Territory (n=1), New South Wales (n=4), Victoria (n=1) and Western Australia (n=4).
- So far in 2018, a total of nine IMD cases have been reported in Aboriginal and Torres Strait Islander peoples. Of these, four cases were due to MenB, four cases were due to MenW and one case is yet to be classified.
- IMD follows a seasonal trend in Australia with cases 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 clonal complex 11 (CC11), including sequence type 11 (ST11) and related STs. CC11 strains are 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 CC11.
- Also of interest is the increase in MenY cases, 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 cases, compared with 40 cases (17%) in 2016, 22 cases (12%) in 2015 and 12 cases (7%) in 2014. YTD in 2018 MenY has accounted for 26% (14/53) of all IMD cases.

## ANALYSIS

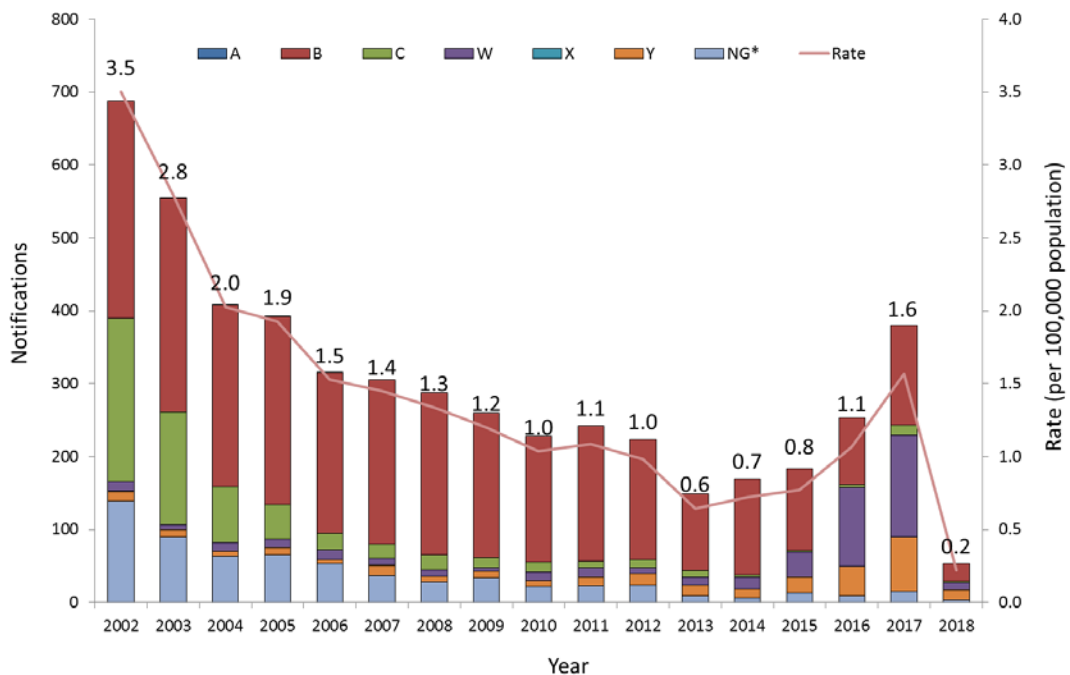
### *Serogroup trends*

- 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 (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 53 cases of IMD, representing a notification rate of 0.2 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 reported.
  - From 2002 to 2015 MenB, accounted for between 43% and 78% of cases annually. In 2017 there were 137 cases of MenB, a 49% increase on the number of cases notified to the

NNDSS in 2016 (n=92). So far in 2018, 45% of IMD cases (n=24) reported 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 nationally funded MenC vaccine. YTD in 2018, there has been two cases of MenC reported to the NNDSS, accounting for 4% of IMD cases.
- Cases of MenW have been increasing since 2013 with case numbers 7.2 times higher in 2017 (n=139) compared to 2014 (n=17). In 2018 YTD, MenW cases accounted for 19% (n=10) of IMD cases.
- Annual cases of MenY have ranged from 5 to 75 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, 22 cases in 2015 and 12 cases in 2014. YTD in 2018, 14 MenY cases have been reported, accounting for 26% of cases.
- Serogroup A (MenA) and serogroup X (MenX) are rare, with a total of only 4 and 2 cases respectively since 2002. There have been no cases of either MenA or MenX in 2018 YTD.

**Figure 1. Cases and rates of IMD, Australia, 2002 to 2018 YTD<sup>#</sup>, by serogroup**



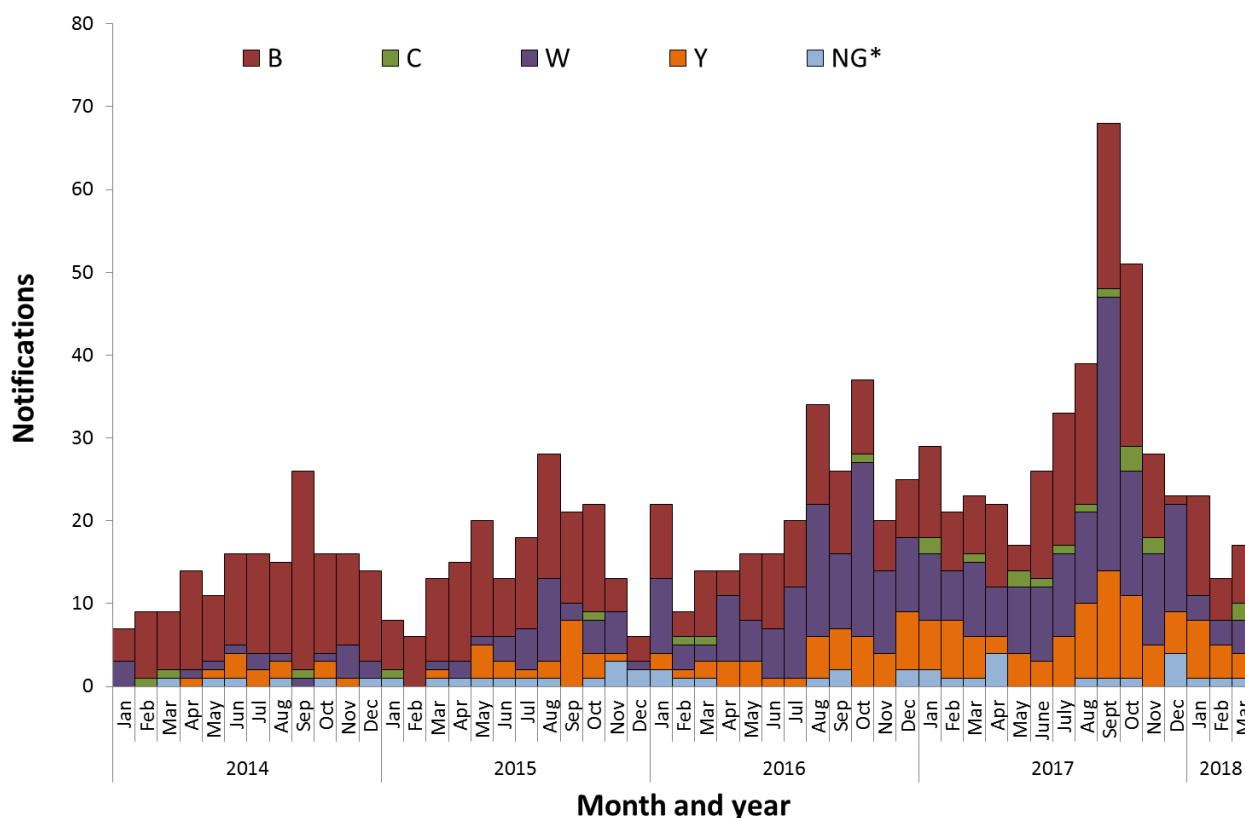
<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

\*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 cases peaking in October (n=37), in 2017 cases peaked in September (n=68), returning to the previously seen seasonal trend of IMD (Figure 2).
- The number of cases reported YTD in 2018 (n=53), were less than the number of cases reported in the same period for 2017 (n=72), but more than the numbers reported in 2016 (n=45).

**Figure 2. Cases of IMD, Australia, 2014 to 2018 YTD<sup>#</sup>, by month and year of diagnosis and serogroup**



<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

<sup>\*</sup>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 Tasmania.
- MenW cases have been reported from the Australian Capital Territory (n=1), New South Wales (n=4), Victoria (n=1) and Western Australia (n=4) YTD in 2018 (Table 1).
- The highest notification rate of IMD due to MenW so far in 2018 was in the Australian Capital Territory, with a notification rate of 0.25 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.<sup>1</sup>
- Cases associated with the outbreak were also reported in Queensland, South Australia and Western Australia.
- The Communicable Disease Network of Australia (CDNA) defined cases associated with the outbreak as:

#### Confirmed case

MenW infection meeting the national confirmed case definition for IMD, with the outbreak genetic sequence

AND

Onset from 1 July 2017

AND

Have spent some or all of their incubation period inside the declared outbreak regions

#### Probable case:

As for a 'Confirmed' case, but where the outbreak genetic sequence is not known

- This outbreak was closed by CDNA on 7 March 2018. The last case associated with the outbreak was diagnosed in late December of 2017.
- There were 30 cases associated with this outbreak with the majority of cases reported in the Northern Territory (n=25). Cases were reported from July to December 2017, and all identified as Aboriginal. The median age of cases was 5 years with a range of 0-47 years.

**Table 1. Cases and rates of IMD, Australia, 2018 YTD<sup>#</sup> by state and territory and serogroup**

State or territory	Cases							Total	Rate (per 100,000 population)
	A	B	C	W	X	Y	NG*		
ACT	0	0	0	1	0	0	0	1	0.3
NSW	0	8	1	4	0	5	0	18	0.2
NT	0	0	0	0	0	0	1	1	0.4
QLD	0	6	0	0	0	3	1	10	0.2
SA	0	4	0	0	0	1	0	5	0.3
TAS	0	0	0	0	0	0	0	0	0.0
VIC	0	3	1	1	0	5	1	11	0.2
WA	0	3	0	4	0	0	0	7	0.3
<b>Australia</b>	<b>0</b>	<b>24</b>	<b>2</b>	<b>10</b>	<b>0</b>	<b>14</b>	<b>3</b>	<b>53</b>	<b>0.2</b>

<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

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

**Table 2. Cases and rates of MenW, Australia, 2014 to 2018 YTD\*, by state and territory**

Year	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Australia
	Cases								
2014	0	7	0	3	0	1	4	2	<b>17</b>
2015	0	8	0	4	0	1	17	4	<b>34</b>
2016	1	25	0	13	5	4	48	12	<b>108</b>
2017	0	19	26	16	11	8	36	23	<b>139</b>
2018 YTD	1	4	0	0	0	0	1	4	<b>10</b>
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	10.6	0.3	0.6	1.5	0.6	0.9	0.6
<b>2018 YTD</b>	<b>0.25</b>	<b>0.05</b>	-	-	-	-	<b>0.02</b>	<b>0.16</b>	<b>0.04</b>

<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

### Indigenous status

- Between 2014 and 2018 YTD, a total of 129 IMD cases were reported in Aboriginal and Torres Strait Islander peoples (Table 3). Of these, MenW and MenB were equivalent with each serogroup accounting for 47% (61/129) of IMD cases reported.
- YTD in 2018, nine cases of IMD have been reported in Aboriginal and Torres Strait Islander peoples, of which 44% (4/9) were due to MenW (Table 4).
- From 2014 to 2015, MenB was the predominant serogroup (95%, 20/21 in 2014 and 75%, 12/16 in 2015) reported in Aboriginal and Torres Strait Islander peoples. However in 2016, this shifted 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% (44/59) of all IMD cases. YTD in 2018, cases of MenW are equivalent to MenB with 47% (4/9) of cases due to each serogroup.

- In 2018 YTD, the notification rate of MenW reported in Aboriginal and Torres Strait Islander peoples was 1.4 per 100,000 population compared with the notification rate of 0.2 per 100,000 in non-Indigenous populations (Table 4).

**Table 3. Cases of IMD, Australia, 2014 to 2018 YTD<sup>#</sup> by Indigenous status and serogroup**

IMD serogroup	Year	Indigenous	Non-Indigenous	Not stated	Total
<b>B</b>	2014	20	109	2	131
	2015	12	97	3	112
	2016	12	80	0	92
	2017	13	121	3	137
	2018 YTD	4	19	1	24
<b>C</b>	2014	0	3	0	3
	2015	0	2	0	2
	2016	0	3	0	3
	2017	0	14	0	14
	2018 YTD	0	2	0	2
<b>W</b>	2014	0	17	0	17
	2015	3	30	1	34
	2016	10	98	0	108
	2017	44	93	2	139
	2018 YTD	4	6	0	10
<b>Y</b>	2014	0	12	0	12
	2015	0	22	0	22
	2016	2	38	0	40
	2017	2	72	1	75
	2018 YTD	0	13	1	14
<b>NG*</b>	2014	1	4	0	5
	2015	1	11	0	12
	2016	0	9	0	9
	2017	0	15	0	15
	2018 YTD	1	2	0	3
<b>TOTAL</b>		<b>129</b>	<b>892</b>	<b>14</b>	<b>1,035</b>

<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

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

**Table 4. Cases and rates of IMD, Australia, 2018 YTD<sup>#</sup> by Indigenous status and serogroup**

IMD serogroup	Indigenous		Non-Indigenous <sup>^</sup>	
	Cases	Rate per 100,000	Cases	Rate per 100,000
B	4	0.6	20	0.08
C	0	-	2	0.01
W	4	0.6	6	0.03
Y	0	-	14	0.06
NG*	1	0.2	2	0.01
<b>All IMD</b>	<b>9</b>	<b>1.4</b>	<b>44</b>	<b>0.2</b>

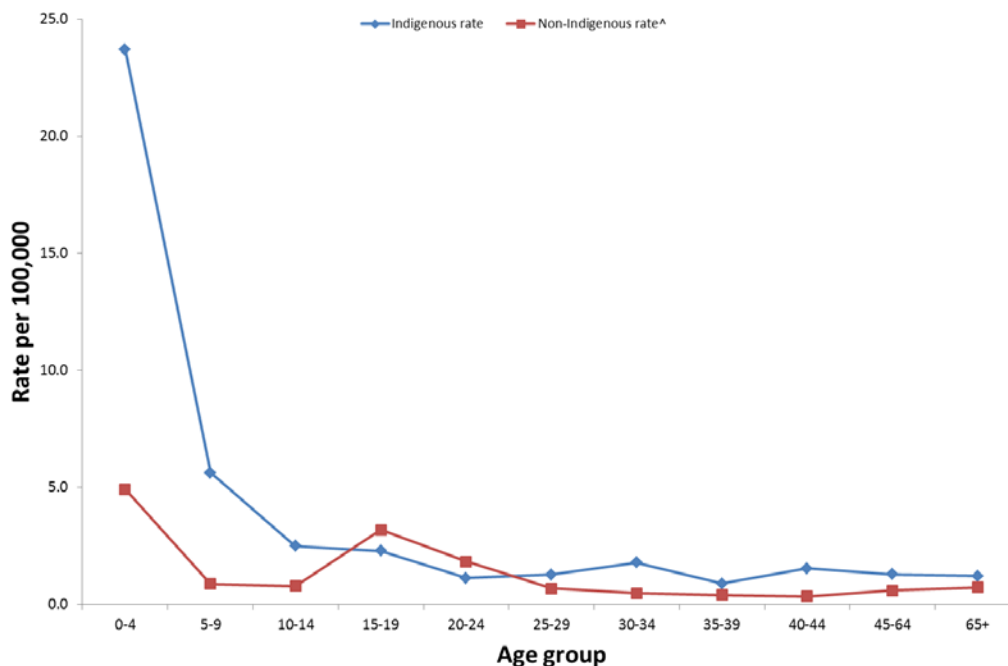
<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

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

<sup>^</sup>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 (23.7 per 100,000) and 5-9 years (5.6 per 100,000) compared to those who reported as non-Indigenous; 4.9 per 100,000 and 0.9 per 100,000 respectively (Figure 3).

**Figure 3. Notification rates of IMD, Australia, 2002 to 2018 YTD<sup>#</sup>, by Indigenous status and age group**



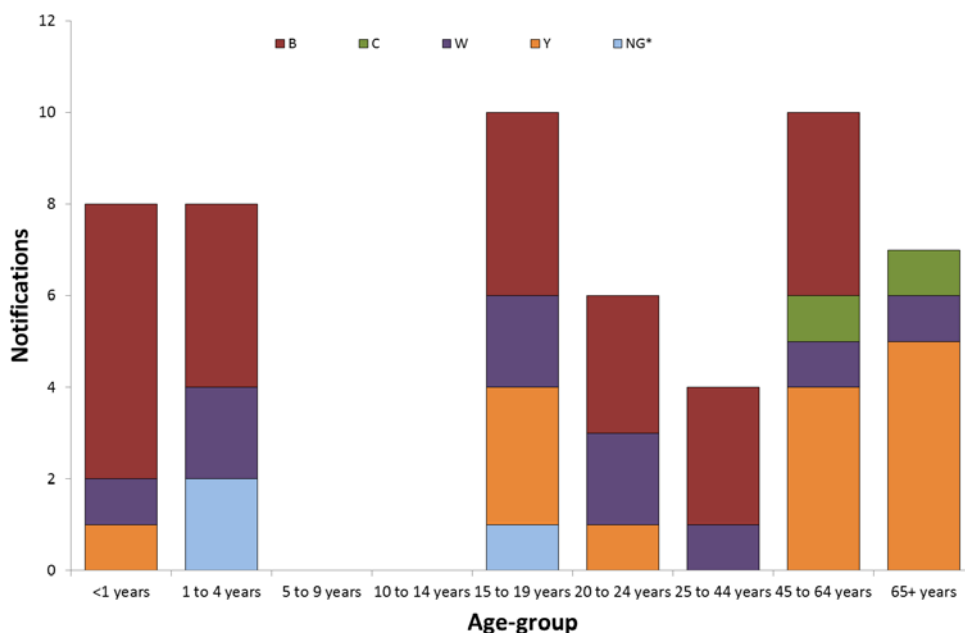
<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

<sup>^</sup>Non-Indigenous includes case reported as non-Indigenous and not stated.

**Age distribution**

- So far in 2018, there have been cases of MenW reported in all age groups except the 5-9 years and 10-14 years age groups (Figure 4).
- For MenY, all but one of the cases reported YTD in 2018 have been in people aged 15 years and older (n=13). There was one case reported in an infant aged less than 1 year.
- 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).

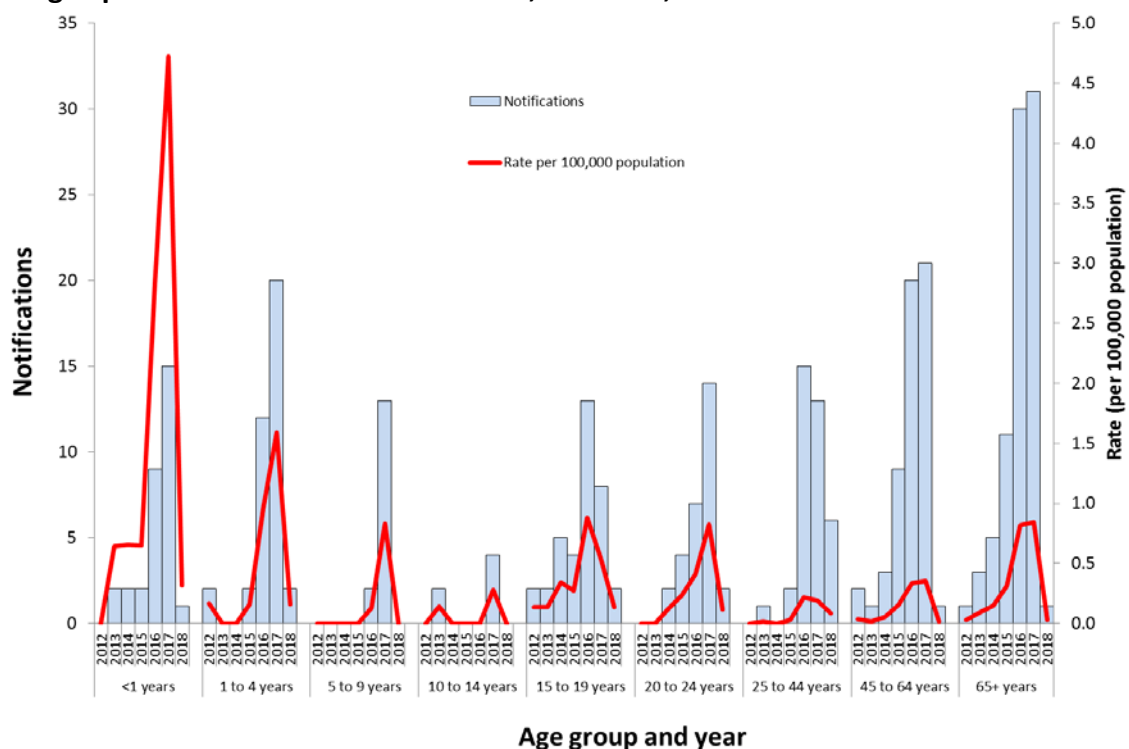
**Figure 4. Cases of IMD, Australia, 2018 YTD<sup>#</sup>, by specified age group and serogroup**



<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 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 cases and rates of MenW, Australia, 2012 to 2018 YTD<sup>#</sup>**



<sup>#</sup> Data from the NNDSS with a diagnosis date up until of 31 March 2018. Data was extracted on 23 April 2018.

### **Clinical presentation and severity**

- In 2018 YTD, there has been one death due to MenB reported. 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% during the same period.
- The mortality reporting against each notification of IMD is not complete, but has improved over time.
- Nearly all MenW cases identified in Australia since 2013 belong to hypervirulent clonal complex 11 (CC11), including sequence type 11 (ST11) and related sequence types.
- Of the 108 cases of MenW reported in 2016, 98 isolates had sufficient fine typing information. The majority of the MenW CC11 isolates were ST11 (70 of 98 isolates).
- In 2017, 112 (81%) MenW cases had isolates with sufficient typing information. The majority of the MenW CC11 isolates were ST 11 (68%, 76/112). In 2017 there was a cluster of ST1287 isolates, accounting for 21% (23/112) of cases reported with sufficient fine typing information. These isolates were from cases associated with the 2017 outbreak in Central Australia (see case definition above), which may have had its origin in ST1287 cases first identified in the Goldfields region of Western Australia in 2016.
- ST11 strains are associated with a high case fatality and atypical clinical presentation, making early diagnosis challenging.<sup>2</sup>
- Non-specific presentation is not uncommon for IMD, making 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.<sup>3</sup>
- Currently immunisation against meningococcal disease in Australia has been targeted at MenC, with a NIP funded vaccine administered to children at 12 months of age. The Pharmaceutical Benefits Advisory Committee (PBAC) has recommended that the MenC vaccine on the NIP be replaced with a funded MenACWY vaccine. The Department of Health is currently working on implementing this recommendation.

## Source

- Data extracted from the NNDSS on 23 April 2018.
- 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.
- Line-listed de-identified enhanced data on 631 IMD cases from 1 January 2016 to 31 December 2017 were collected by excel spreadsheet from all states and territories. Enhanced fields included fine typing information.
- IMD cases were considered to have adequate fine typing information if a valid PorA and FetA were reported. For cases reported with a valid PorA and FetA but with no sequence type (ST), these cases were assumed to have the same ST as case reported with the same PorA and FetA and a valid ST.

## REFERENCES

<sup>1</sup> Northern Territory Government, 2017. Health Alert: Meningococcal outbreak in Central Australia. available at: <http://mediareleases.nt.gov.au/mediaRelease/23733>

<sup>2</sup> 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.

<sup>3</sup> Christensen H. et al. 2010. Meningococcal carriage by age: a systematic review and meta-analysis. *Lancet Infectious Diseases Dec 2010: 853-61.*