



# Meningococcal disease

## MENINGOCOCCAL VACCINES FOR AUSTRALIANS: INFORMATION FOR IMMUNISATION PROVIDERS

This fact sheet provides information for immunisation providers on meningococcal disease and the use of meningococcal vaccines in Australia. It can be used in conjunction with the NCIRS fact sheet [Meningococcal vaccines – frequently asked questions](#) to facilitate discussions with parents or other individuals considering receiving meningococcal vaccines.

### Disease and epidemiology

- Meningococcal disease is a rare but serious infection caused by the bacterium *Neisseria meningitidis*. There are 13 serogroups. Meningococcal disease is most commonly caused by serogroups A, B, C, W and Y.
- The incidence of meningococcal disease fluctuates naturally over time. In Australia, the national notification rate of meningococcal disease declined from 2002 to 2013, but has increased since 2014. Serogroup B disease has been dominant until recently, but has been naturally declining in most states and territories, even in the absence of widespread vaccination against this serogroup. Serogroup W disease has increased since 2013; this is now the main serogroup causing meningococcal disease (44.7% of cases with identified serogroup) in Australia in 2016. Serogroup C disease has become very rare (1.2% of cases with identified serogroup in 2016) since the introduction of the conjugate meningococcal C vaccine to the National Immunisation Program (NIP) in 2003.
- Septicaemia and/or meningitis are the most common clinical manifestations of invasive meningococcal disease (IMD). The highest incidence of meningococcal disease is in children aged <5 years and adolescents aged 15–19 years. Carriage rates of the bacteria are highest in older adolescents and young adults. Serogroup B disease remains the most common cause of IMD in children, adolescents and young adults. Serogroup W disease occurs over a more diverse age range and may present with less typical clinical manifestations than disease due to other serogroups.

### Vaccines

- Three types of meningococcal vaccines are available in Australia:
  - meningococcal C conjugate vaccine (MenCCV): Menitorix<sup>®</sup> (Hib–MenCCV; combination formulation with the *Haemophilus influenzae* type b (Hib) vaccine), NeisVac-C<sup>®</sup> (monovalent meningococcal C vaccine)
  - recombinant meningococcal B vaccines (MenBV): Bexsero<sup>®</sup>, Trumenba<sup>®</sup>
  - quadrivalent (A, C, W, Y) meningococcal conjugate vaccines (4vMenCV): Menactra<sup>®</sup>, Menveo<sup>®</sup>, Nimenrix<sup>®</sup>. (These replace quadrivalent polysaccharide vaccines which have been discontinued.)

### Who should be vaccinated

- **People at increased risk of IMD:** Those with complement disorders, asplenia and other immunocompromising conditions, or occupational exposure (e.g. laboratory personnel who frequently handle *Neisseria meningitidis*) should be vaccinated with MenBV and 4vMenCV.
- **People within age groups with increased incidence of IMD or high carriage rates of *N. meningitidis*:**
  - *Infants and young children, particularly those ≤2 years of age:* Routine MenCCV at 12 months of age is recommended and funded under the NIP. MenBV (Bexsero<sup>®</sup> only) is also recommended, and 4vMenCV may be offered to protect against A, C, W and Y serogroups. MenBV and 4vMenCV are available through private prescription for this age group, but are not funded under the NIP.
  - *Adolescents (15–19 years of age) and some young adults:* MenBV is recommended, and 4vMenCV may be offered, particularly for those living in close quarters such as new military recruits and students living in residential accommodation. In some Australian states, these vaccines are funded for this age group in response to locally predominant meningococcal B or W disease (refer to [Table 1](#)).

- **Travellers:** 4vMenCV is recommended for travellers to certain destinations where there is an increased risk of exposure to serogroups A, C, W or Y (including, but not limited to, the 'meningitis belt' of sub-Saharan Africa). 4vMenCV is required for pilgrims attending the annual Hajj in Mecca.
- **Anyone wishing to reduce their risk of IMD:** Vaccination with MenBV (from 6 weeks of age) and 4vMenCV (from 2 months of age) may be offered (available through private prescription) (refer to [Table 1](#)).

The Australian Technical Advisory Group on Immunisation (ATAGI) is currently reviewing the use of meningococcal vaccines in Australia and will be updating the meningococcal chapter of *The Australian Immunisation Handbook*. Some of the information contained within this fact sheet and the FAQ is not currently in the *Handbook*.

**Table 1: Meningococcal vaccines available for use in Australia and groups recommended for vaccination**

Trade name	Formulation	Provides protection against serogroup:					Population group recommended for vaccination (refer also to <a href="#">Who should be vaccinated</a> ) and current access/availability as of March 2018
		A	B	C	W	Y	
<b>Meningococcal C conjugate vaccines (MenCCV)</b>							
Menitorix <sup>®</sup>	Hib–MenC conjugate combination			✓			Recommended for all children at 12 months of age (all adolescents should have been vaccinated). Monovalent meningococcal C vaccine replaced by Hib–MenCCV combination vaccine for use under the NIP since July 2013, with limited or no availability of separate Hib vaccines.
		Menitorix <sup>®</sup> also serves as a booster dose of Hib vaccine					
NeisVac-C <sup>®</sup>	Monovalent MenC conjugate			✓			
<b>Recombinant meningococcal B vaccines (MenBV)</b>							
Bexsero <sup>®</sup>	Recombinant multicomponent MenB		✓*				Recommended for infants and young children, particularly those aged <2 years, adolescents aged 15–19 years, and those with increased medical, occupational or other exposure (including those living in close quarters) risks of MenB disease. Vaccination can be offered to anyone aged ≥6 weeks wishing to reduce the risk of MenB disease. Doses required vary by age.* Available through private prescription. Available in South Australia from April 2017 in a statewide 2-year clinical study for students enrolled in years 10, 11 and 12 in 2017 at participating schools. <sup>†‡</sup>
Trumenba <sup>®</sup>	Recombinant bivalent fHBP MenB		✓				Recommended for adolescents aged 15–19 years and those with increased medical risk of MenB disease. Vaccination can be offered to anyone aged ≥10 years wanting to reduce the risk of MenB disease. Available through private prescription.
<b>Quadrivalent meningococcal conjugate vaccines (4vMenCV)<sup>§</sup></b>							
Menactra <sup>®</sup>	Quadrivalent diphtheria toxoid conjugate	✓		✓	✓	✓	Recommended for those with increased medical, occupational or other exposure (including travel) risks of meningococcal disease caused by serogroups A, C, W or Y.
Menveo <sup>®</sup>	Quadrivalent CRM <sub>197</sub> conjugate	✓		✓	✓	✓	Vaccination may be offered to anyone aged ≥2 months wishing to reduce the risk of disease (refer also to NCIRS fact sheet <a href="#">Meningococcal vaccines – frequently asked questions</a> ). Available through private prescription.
Nimenrix <sup>®</sup>	Quadrivalent tetanus toxoid conjugate	✓		✓	✓	✓	Available through state-funded programs in six states and territories (New South Wales, Victoria, Tasmania, Queensland, Western Australia, and the Australian Capital Territory) for some adolescents. Eligibility varies between state and territory

							programs. <sup>†</sup> Local outbreak responses in some states and territories are underway. <sup>†</sup>
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\* Bexsero<sup>®</sup> protects against meningococcal B (MenB) disease. There are many strains of serogroup B meningococcus. Bexsero<sup>®</sup> is estimated to protect against 76% of MenB strains in Australia.<sup>1</sup> Refer to [Table 3](#) for dosing guidelines.

<sup>†</sup> Refer to state and territory health department [websites](#).

‡ Funded doses of Bexsero<sup>®</sup> for this age group in South Australia are provided through a population-level study assessing the impact of the vaccine on nasopharyngeal carriage of *N. meningitidis* and herd immunity.<sup>2</sup>

§ Vaccine brands are registered for use in different age groups (refer to [Table 2](#)).

## The disease

Meningococcal disease is a relatively rare but serious infection caused by the bacterium *Neisseria meningitidis*, commonly known as the meningococcus. There are 13 serogroups, distinguished by differences in the surface polysaccharides of the organism's outer membrane capsule. Globally, most meningococcal disease is caused by serogroups A, B, C, W and Y.

Today, even with antibiotic treatment, the mortality rate for meningococcal disease is approximately 5–10%. Furthermore, about 10–30% of children and adolescents who survive the disease develop permanent sequelae such as limb deformity, skin scarring, deafness and neurological deficits.<sup>3-5</sup>

### Clinical features

Invasive meningococcal disease (IMD; defined by isolation of meningococci from body sites that are normally sterile) most commonly manifests as septicaemia and meningitis. Typical symptoms are often non-specific and can include sudden onset of fever, a rash that can be petechial or purpuric (like red-purple spots or bruises) or maculopapular (a flat or raised non-specific rash), headache, neck stiffness, photophobia, altered consciousness, muscle aches, joint pain, nausea and vomiting.<sup>3,6-8</sup> Other less common manifestations of meningococcal disease include pneumonia, arthritis, epiglottitis, pericarditis and conjunctivitis.<sup>6,7,9</sup> Primary meningococcal conjunctivitis may precede invasive disease.<sup>10</sup> Serogroup W disease has been associated with higher rates of atypical presentations in up to 20% of cases.<sup>11</sup>

Not all symptoms or signs may be present at disease onset. The characteristic rash of meningococcal disease (a rash which does not disappear with gentle pressure on the skin) is not always present.

### Transmission

Meningococci are carried and transmitted only by humans. Individuals within a population can carry meningococci in their throat and/or nose. The prevalence and duration of carriage varies over time and in different populations and age groups, with peak carriage rates (>20%) occurring in adolescents.<sup>12</sup>

Meningococcal bacteria are transmitted in respiratory droplets. The risk of acquiring infection is increased by regular, prolonged close contact, such as living in the same household or intimate kissing.

The disease has an incubation period of 1–10 days, most commonly 3–4 days.

### Risk factors for acquiring the disease

Individuals who are immunocompromised due to certain disorders of the immune system (particularly complement

deficiencies), certain medical treatments, or functional or anatomical asplenia have an increased risk of acquiring the disease.

Other risk factors for meningococcal infection include occupational exposure to meningococci in microbiological laboratories, exposure to smokers (who are more likely to be carriers), crowded living conditions, intimate kissing with multiple partners, and recent or current viral infection of the upper respiratory tract.<sup>6,8</sup>

### Management of meningococcal disease

Invasive meningococcal disease is notifiable in all states and territories, and prompt diagnosis and medical treatment is important. If meningococcal disease is suspected, the patient should be treated promptly with appropriate parenteral antibiotics and hospitalised for further management. The relevant state or territory public health authority should be notified as soon as possible so that contacts can be identified and the appropriate public health response determined in accordance with national guidelines.<sup>13</sup> This may include vaccination of contacts (refer to [Use of vaccines for close contacts...](#)).

## Epidemiology

Meningococcal disease is both sporadic and epidemic throughout the world. Its incidence fluctuates naturally over time. In Australia, meningococcal disease follows a seasonal trend, with most cases occurring in winter or early spring.<sup>14,15</sup> Notification rates decreased from a peak of 3.5 cases per 100,000 in 2002 to 0.6 per 100,000 in 2013. Notification rates have increased since 2014, reaching 1.1 per 100,000 in 2016<sup>16</sup> (Figure 1). Most meningococcal disease occurs in young children <5 years of age and in older adolescents/young adults (15–24 years of age).<sup>14</sup>

Nationally, for over a decade prior to 2016, serogroup B ('MenB') was the most common serogroup causing invasive meningococcal disease (accounting for 63% to 88% of annual notified cases where a serogroup was identified from 2006 to 2015).<sup>17</sup> However, the incidence of serogroup B disease has declined even in the absence of any significant vaccine use. The incidence fell from 1.5 per 100,000 in 2002 to 0.4 per 100,000 in 2016 (data from NNDSS provided by Office of Health Protection, Australian Government Department of Health).<sup>11,14</sup> MenB remains the most common cause of IMD in children, adolescents and young adults (Figure 2). The highest incidence of MenB disease is in children aged <5 years, particularly infants aged <1 year, with a lower, secondary peak in late adolescence and early adulthood (15–19 years). However, future trends cannot be predicted.

Since 2013, serogroup W ('MenW') has emerged as an increasing cause of meningococcal disease.<sup>11</sup> There were 17 cases (10.4% of cases with an identified serogroup) in

2014, rising to 34 cases (20.0%) in 2015, and 109 cases (44.7%) in 2016, surpassing serogroup B (92 cases, 37.7%).<sup>11,16</sup> Many MenW cases were due to a single clone of meningococcus, the ST11 strain type, suggesting sustained person-to-person transmission.<sup>16</sup>

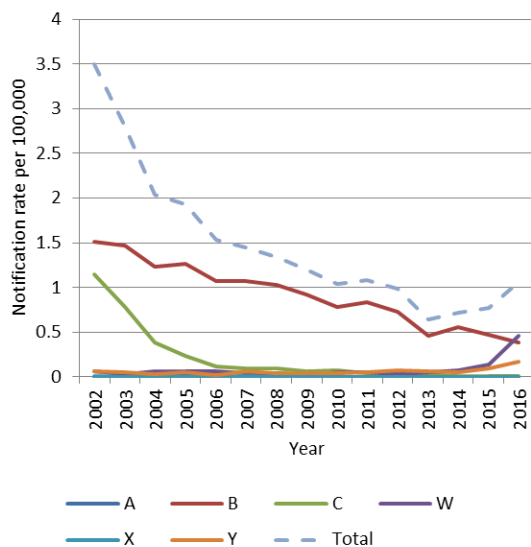
While the incidence of MenW disease (like MenB) has peaks in the <5 years and 15–19 years age groups, a large proportion of all MenW cases occurs in adults ≥45 years of age (median age of MenW cases is 44 years),<sup>11</sup> and MenW accounted for 59% of IMD in adults aged ≥65 years in 2016 (Figure 2).<sup>16</sup>

MenW disease appears to have a higher case fatality rate than disease caused by other serogroups (about 7% for MenW versus about 4% for MenB). This may indicate a tendency towards more severe infection or reflect the higher proportion of cases of MenW occurring in the elderly.<sup>11</sup>

Serogroup C ('MenC') disease has almost disappeared following implementation of the national MenC conjugate vaccination program in 2003, with the number of cases falling from 225 in 2002 to 3 (1.2% of cases with an identified serogroup) in 2016.<sup>16</sup>

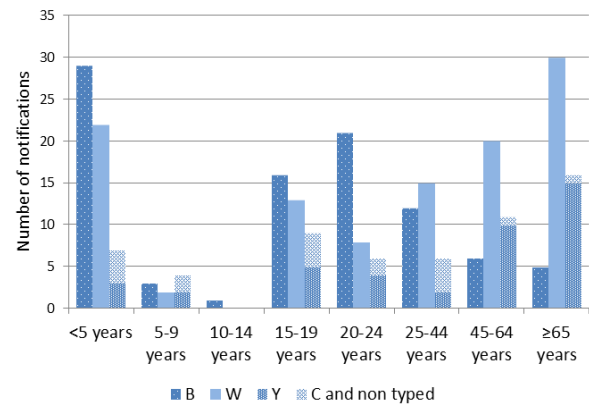
A smaller but notable increase in serogroup Y disease has occurred in the recent few years, from 12 cases (7.4% of those with an identified serogroup) in 2014 to 40 cases (16.4%) in 2016.<sup>11,16</sup> Serogroup A disease remains rare in Australia. Updated epidemiological data on meningococcal disease are available at [the Australian Government Department of Health](http://the.Australian.Government.Department.of.Health) website.

**Figure 1: National notification rates for invasive meningococcal disease by serogroup, Australia, 2002–2016**



Source: National Notifiable Diseases Surveillance System (NNDSS) data provided by Office of Health Protection, Australian Government Department of Health.

**Figure 2: Notifications of invasive meningococcal disease by age group and serogroup,\* Australia, 2016**



\* No cases of serogroup A or X disease were recorded in 2016. Adapted from *Invasive meningococcal disease national surveillance report*, January 2017.<sup>16</sup>

## Vaccines

There is no single vaccine that offers protection against all serogroups that cause meningococcal disease. There are three types of meningococcal vaccines registered in Australia, which cover different serogroups:

- meningococcal C conjugate vaccines (MenCCV)
- recombinant meningococcal B vaccines (MenBV)
- quadrivalent (A, C, W, Y) meningococcal conjugate vaccines (4vMenCV). (These have replaced quadrivalent meningococcal polysaccharide vaccines which were withdrawn from the Australian market in early 2017.)

### Meningococcal C conjugate vaccine (MenCCV)

In MenCCVs, the serogroup C antigen is conjugated to a carrier protein. In Australia, the use of MenCCVs from 2003 under the National Immunisation Program (NIP) resulted in a 96% (95% CI 94–98%) reduction in MenC invasive disease in all age groups by 2012, with evidence of indirect protective benefits ('herd immunity') in non-vaccinated age groups.<sup>18</sup>

MenCCV is available as a combination formulation of meningococcal C conjugate and *Haemophilus influenzae* type b vaccines (Hib–MenCCV), **Menitorix**<sup>®</sup> (GlaxoSmithKline) – which is included on the NIP schedule at 12 months of age – or as a monovalent meningococcal C vaccine, **NeisVac-C**<sup>®</sup> (Pfizer).

### Quadrivalent meningococcal conjugate vaccines (4vMenCV)

In 4vMenCVs, the polysaccharide antigens of four serogroups (A, C, W and Y) are conjugated to a carrier protein. Clinical trials have demonstrated the immunogenicity of 4vMenCV in children, adolescents and adults. All studies indicate that 4vMenCVs are safe and immunogenic.<sup>19</sup>

4vMenCVs have replaced quadrivalent meningococcal polysaccharide vaccines (i.e. vaccines without protein conjugation). Conjugate vaccines have good immunogenicity in infants and younger children, and induce a T cell-dependent immune response, important for immunological memory, both of which are lacking with polysaccharide vaccines.

The 4vMenCVs available for use in Australia are:

- **Menactra**<sup>®</sup> (Sanofi Pasteur)
- **Menveo**<sup>®</sup> (GlaxoSmithKline)
- **Nimenrix**<sup>®</sup> (Pfizer).

Dosing for 4vMenCV depends on age group and indication. Refer to [Table 2](#) below (which contains manufacturers' recommendations) and the NCIRS fact sheet [Meningococcal vaccines – frequently asked questions](#) for 4vMenCV dosing in healthy individuals. For persons at increased medical risk of IMD, refer to [Table 4.10.2 in The Australian Immunisation Handbook](#), 10th edition, 2015 update.<sup>20</sup>

### Recombinant meningococcal B vaccines (MenBV)

**Bexsero**<sup>®</sup> (Novartis) is a recombinant multicomponent vaccine designed to provide protection against multiple strains of MenB. It contains four major antigens that are highly conserved across multiple MenB strains. Based on laboratory tests, it is estimated that the vaccine induces protective antibodies against about 76% of MenB strains in Australia.<sup>1</sup> This vaccine differs from other MenB vaccines used in the past in other countries, for example New Zealand, for control of epidemics dominated by a single MenB strain.<sup>21</sup>

The clinical efficacy of Bexsero<sup>®</sup> cannot feasibly be assessed in clinical trials as invasive MenB disease is rare. Instead, the immunogenicity of this vaccine has been demonstrated through laboratory methods that correlate with protection against clinical meningococcal disease. There is currently a lack of data on the duration of protection of Bexsero<sup>®</sup> and the immunogenicity of Bexsero<sup>®</sup> in people who are immunocompromised.

The primary vaccination course of Bexsero<sup>®</sup> consists of 2 to 4 doses, depending on the age at which the course commences. Refer to [Table 3](#) for more details.

Bexsero<sup>®</sup> may be administered concurrently, at separate injection sites, with other infant vaccines in the NIP schedule. However, concurrent administration of Bexsero<sup>®</sup> with other vaccines will increase the frequency of vaccine-related adverse reactions, most notably fever, compared to when Bexsero<sup>®</sup> or other vaccines are administered on their own. Due to this concern, the prophylactic use of paracetamol is recommended with

every dose of Bexsero<sup>®</sup> for children <2 years of age (refer to [Vaccine safety](#)).

Individuals who have previously received other meningococcal vaccines (including the strain-specific meningococcal B vaccine previously used in New Zealand) can receive Bexsero<sup>®</sup>.

**Trumenba**<sup>®</sup> (Pfizer) is a recombinant bivalent fHBP vaccine consisting of two surface proteins that are highly conserved across >95% MenB strains.

Clinical trials have shown that this vaccine is safe and immunogenic in adolescents and young adults ≥10 years, and can be used in a 2- or 3-dose schedule depending on the person's medical risk of IMD. Refer to [Table 3](#) below for more details.<sup>22,23</sup>

Trumenba<sup>®</sup> may be administered concomitantly with other vaccines. Trumenba<sup>®</sup> and Bexsero<sup>®</sup> are not interchangeable. The same vaccine should be used to complete the vaccination course.

### Who should be vaccinated

A summary of the meningococcal vaccines registered for use in Australia and who should be vaccinated can be found in [Table 1](#) and below. Recommended brands and doses of 4vMenCV by age group, for healthy individuals, can be found in [Table 2](#). Recommended brands and doses of MenBV by age group for healthy individuals can be found in [Table 3](#). Refer also to the NCIRS fact sheet [Meningococcal vaccines – frequently asked questions](#).

#### Healthy infants and younger children

- A single dose of MenCCV is recommended for all children at the age of 12 months, provided through the NIP. Since July 2013, it is given in a combination formulation with the Hib vaccine (Hib–MenCCV).
- Healthy children who missed receiving a dose of MenCCV at 12 months of age, or who received their last dose aged <12 months, should receive a catch-up dose.
- MenBV (Bexsero<sup>®</sup> only) is recommended for infants and young children, particularly those aged <2 years.
- 4vMenCV is available through private prescription to any child from 2 months of age whose parents/carers wish to reduce the likelihood of them becoming ill with serogroup A, C, W and Y disease.
- Although 4vMenCV can be used to replace the MenCCV dose at age 12 months, a dose of Hib–MenCCV (Menitorix<sup>®</sup>) is still required to serve as the booster dose for Hib vaccine in the 2nd year of life. It is considered preferable that 4vMenCV not be administered concurrently with Menitorix<sup>®</sup>, but with an interval of 4 weeks between vaccines, due to uncertainties about the possibility of interference of antibody responses.

- There are differences between vaccine brands in the number of 4vMenCV doses required for children aged <24 months. For guidance on 4vMenCV dosing by age refer to [Table 2](#). Additional information is available in the NCIRS fact sheet [Meningococcal vaccines – frequently asked questions](#).

### Healthy adolescents and young adults

- Healthy adolescents who missed receiving a dose of MenCCV in childhood should receive a catch-up dose.
- A 2-dose schedule of MenBV is recommended for all adolescents aged 15–19 years. It is particularly recommended for adolescents and young adults living in close conditions such as military recruits or those in residential accommodation. Either MenB vaccine can be given, but the same vaccine should be used to complete the series.
- A single funded dose of 4vMenCV is available for adolescents (aged 15–19 years) in targeted programs in some states or territories as a response to the recent emergence of MenW disease (refer to [Table 1](#)). These programs are generally delivered through school-based immunisation, with some provided through primary care; check state or territory health department [websites](#) for further information. Vaccination can be offered to adolescents in other states and territories and young adults living in close quarters through private prescription.

### Healthy people in other age groups

- 4vMenCV and MenBV are available through private prescription to any person aged  $\geq 2$  months (for 4vMenCV) or  $\geq 6$  weeks (for MenBV) who wants to reduce their likelihood of becoming ill with meningococcal disease. Dosing schedules vary by age and vaccine. For guidance on 4vMenCV dosing by age

refer to [Table 2](#) below, and for guidance on MenBV dosing by age refer to [Table 3](#).

### Those with medical conditions associated with increased risk of meningococcal disease

- 4vMenCV and MenBV are recommended for individuals with medical conditions associated with an increased risk of meningococcal disease. These conditions include inherited defects or deficiency of properdin or complement components, current or future treatment with eculizumab, functional or anatomical asplenia, HIV infection and haematopoietic stem cell transplant.
- The appropriate vaccine formulations and the required doses, including the need for a booster dose, differ by age and vaccine. For dosing schedules, refer to [Table 3](#) for MenBV and *The Australian Immunisation Handbook*, 10th edition, 2015 update<sup>20</sup> – [Table 4.10.2](#) for 4vMenCVs.

### Laboratory personnel who frequently handle *Neisseria meningitidis*, and travellers

- For people with occupational exposure risks, a single primary dose of 4vMenCV and a primary course of 2 doses of MenBV (as per the dosing schedule in [Table 3](#)) are recommended. 4vMenCV boosters every 5 years are also recommended until further information regarding duration of immunity afforded by 4vMenCV becomes available.
- For travellers, 4vMenCV is recommended for people (aged  $\geq 2$  months) who intend to travel to parts of the world where epidemics of group A, C, W or Y disease are frequent. Vaccination is a requirement for pilgrims attending the annual Hajj in Mecca (certificate of vaccination is a condition of entry to Saudi Arabia for this purpose). Refer to [Table 2](#) for dosing and booster guidelines according to age.

**Table 2: Recommended brands and doses of 4vMenCV by age group, for healthy individuals, travellers and laboratory personnel\***

Age at commencement of vaccine course	Brands registered for use in Australia <sup>†</sup>	Number of doses required	Recommended interval between doses	Notes*
2–6 months	Menveo <sup>®</sup>	4	8 weeks	4th dose to be given at 12 months of age or 8 weeks after the 3rd dose, whichever is later
7–11 months	Menveo <sup>®</sup>	2	8 weeks	2nd dose to be given at 12 months of age or 8 weeks after the 1st dose, whichever is later
12–23 months	<i>Either</i> Menveo <sup>®</sup>	2	8 weeks	Routine booster dose not currently recommended
	<i>Or</i> Nimenrix <sup>®</sup>	1	Not applicable	
≥2 years <sup>‡</sup>	Menactra <sup>®</sup> , Menveo <sup>®</sup> or Nimenrix <sup>®</sup>	1	Not applicable	Routine booster dose not currently recommended <sup>§</sup>

\* Adapted from Chapter 4.10 Meningococcal disease, *The Australian Immunisation Handbook*, 10th edition, 2015 update<sup>20</sup> and manufacturers' recommendations in the current product information (PI) for all vaccines. In July 2017, the registered age indication for Menveo<sup>®</sup> was lowered to include children aged from 2 months.

<sup>†</sup> In the event of Menveo<sup>®</sup> not being available, the use of Nimenrix<sup>®</sup> from 6 weeks of age or Menactra from 9 months of age may be appropriate, based on international registration and/or clinical trial data. Refer to the NCIRS fact sheet [Meningococcal vaccines – frequently asked questions](#) for further information.

<sup>‡</sup> There is no registered upper age limit for use of Menveo<sup>®</sup>. Although both Menactra<sup>®</sup> and Nimenrix<sup>®</sup> are registered for use up to 55 years of age, either of these brands can be given to persons >55 years of age, as per [The Australian Immunisation Handbook](#).

<sup>§</sup> For laboratory personnel who handle *Neisseria meningitidis* and travellers who have ongoing exposure to increased risk of group A, C, W or Y meningococcal disease, further booster doses may be required 3-yearly then 5-yearly if primary vaccination occurred at age <7 years, or 5-yearly if primary vaccination occurred at ≥7 years of age. For those with medical conditions associated with increased risk of meningococcal disease, refer to [Table 4.10.2 of The Australian Immunisation Handbook](#).

**Table 3: Recommended brands and doses of MenBV by age group for healthy individuals and laboratory personnel**

Age at commencement of vaccine course	Brands registered for use in Australia	Number of doses required	Recommended interval between doses	Notes
6 weeks–5 months	Bexsero <sup>®</sup>	4	8 weeks	8 weeks between doses; 4th dose at 12 months
6–11 months	Bexsero <sup>®</sup>	3	8 weeks	8 weeks between 1st and 2nd doses; 3rd dose at 12 months or 8 weeks after 2nd dose, whichever is later
12 months–9 years	Bexsero <sup>®</sup>	2	8 weeks	
≥10 years*	<i>Either</i> Bexsero <sup>®</sup>	2	8 weeks	For those with specified medical conditions, 3 doses are required (at least 4 weeks between 1st and 2nd doses; 3rd dose at least 4 months after 2nd dose and at least 6 months after 1st dose)
	<i>Or</i> Trumenba <sup>®</sup>	2	6 months	

\*Bexsero<sup>®</sup> and Trumenba<sup>®</sup> are not interchangeable. The same vaccine should be used to complete the vaccination course.



## Vaccine safety

### Meningococcal conjugate vaccines

Meningococcal conjugate vaccines are generally considered safe and well tolerated.

Common adverse events following MenCCV include pain, tenderness and occasional erythema at the injection site, which tend to be of mild to moderate severity and typically resolve within 1 day. Transient headache may also occur. However, serious adverse reactions are rare.<sup>6</sup>

The most frequently reported adverse events following 4vMenCV include fever, headache, dizziness<sup>24</sup> and erythema at the injection site. Injection site reactions generally resolve within 48–72 hours.<sup>6</sup>

An initial suspicion of an association between a certain brand of 4vMenCV and Guillain-Barré Syndrome (GBS), a rare neurological disorder associated with muscle weakness and paralysis, has been thoroughly investigated and disproven.<sup>25,26</sup>

### Recombinant meningococcal B vaccines

Fever was the most notable systemic reaction in infants and young children in clinical trials for Bexsero<sup>®</sup>. Concurrent administration of Bexsero<sup>®</sup> with other childhood vaccines increases the frequency of fever,<sup>27,28</sup> as shown in [Table 4](#).

**Table 4: Proportion (%) of infants reporting fever within 7 days after at least 1 of the 3 infant doses of Bexsero<sup>®</sup>**

Axillary temperature	Routine vaccines alone	MenBV alone	Routine vaccines + MenBV
≥38°C	23–36%	26–41%	51–62%
≥39°C	3–4%	4–8%	10–15%

Fever in infants and young children given Bexsero<sup>®</sup> can be reduced by prophylactic use of paracetamol (refer to [box](#) below). A clinical trial demonstrated that prophylactic use of paracetamol reduced the likelihood of high-grade fever by approximately half with no overall impact on immunogenicity of Bexsero<sup>®</sup> or the other vaccines given concurrently.<sup>29</sup> Other common adverse events following immunisation with Bexsero<sup>®</sup> include tenderness, swelling and erythema at the injection site, irritability, sleepiness, change in eating habits, unusual crying, rash, vomiting and diarrhoea. Most of these events were considered mild or moderate and were transient in nature. (Refer to [The Australian Immunisation Handbook](#), 10th edition, 2015 update, for further details on adverse events.<sup>20</sup>)

### Prophylactic use of paracetamol with Bexsero<sup>®</sup> vaccination in children aged <2 years

Prophylactic use of paracetamol is recommended with every dose of Bexsero<sup>®</sup> administered to children <2 years of age. This is an exception to the general recommendation not to routinely give paracetamol with vaccinations unless it is for relief of fever or pain following immunisation – refer to *The Australian Immunisation Handbook*, 10th edition, 2015 update ([Chapter 2.3](#)).<sup>20</sup>

Clinical trials also showed that the most common adverse events when Trumenba<sup>®</sup> was administered alone or with other vaccines in adolescents aged ≥10 years were injection site pain, redness and swelling at the injection site, headache, fatigue, chills, muscle pain and joint pain. Most of these events were considered mild or moderate and were transient in nature.<sup>22,23</sup>

### Use of vaccines for close contacts of patients or in public health management of meningococcal disease outbreaks

The meningococcal vaccine that covers the relevant serogroup may be considered for individuals who have had close household or household-like contact with someone who has meningococcal disease, or for individuals at increased disease risk because of a local outbreak (such as an outbreak in a residential facility). The relevant state or territory public health authority should be contacted as soon as possible for guidance on determining the risk of disease, and the need for vaccination and clearance antibiotics. (Refer also to [Management of meningococcal disease](#).)

### Contraindications/precautions

For all meningococcal vaccines, the absolute contraindications are anaphylaxis following a previous dose of the respective vaccine, or anaphylaxis following any component of the vaccine. Previous meningococcal disease, regardless of the serogroup, is not a contraindication for vaccination.<sup>20</sup>

### Additional resources for primary medical care/vaccination providers

- NCIRS fact sheet [Meningococcal vaccines – frequently asked questions](#)
- Australian Government Department of Health: Meningococcal W disease [www.health.gov.au/internet/main/publishing.nsf/Content/ohp-meningococcal-W.htm](http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-meningococcal-W.htm)
- *The Australian Immunisation Handbook*, 10th edition – the most up-to-date clinical recommendations are contained in the online version of the *Handbook*

[www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook10-home](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook10-home)

- Immunise Australia website [www.immunise.health.gov.au](http://www.immunise.health.gov.au)
  - National Immunisation Program schedule [www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/national-immunisation-program-schedule](http://www.immunise.health.gov.au/internet/immunise/publishing.nsf/Content/national-immunisation-program-schedule)
  - ACT Health [www.health.act.gov.au](http://www.health.act.gov.au)
  - Health.vic [www.health.vic.gov.au](http://www.health.vic.gov.au)
  - Northern Territory Department of Health <https://health.nt.gov.au>
  - NSW Health [www.health.nsw.gov.au/immunisation](http://www.health.nsw.gov.au/immunisation)
  - Queensland Health [www.health.qld.gov.au](http://www.health.qld.gov.au)
  - SA Health [www.sahealth.sa.gov.au](http://www.sahealth.sa.gov.au)
  - Tasmanian Department of Health and Human Services [www.dhhs.tas.gov.au](http://www.dhhs.tas.gov.au)
  - WA Health [www2.health.wa.gov.au](http://www2.health.wa.gov.au)
  - Centers for Disease Control and Prevention (USA): Meningococcal disease [www.cdc.gov/meningococcal](http://www.cdc.gov/meningococcal)
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