The routine infant meningococcal B (MenB) vaccine against meningitis and septicaemia

In the UK and Ireland babies are offered the MenB (meningococcal group B) vaccine, Bexsero, as part of the routine immunisation schedule at 2, 4 and 12 months of age.

Some families in the UK and Ireland have also chosen to pay for MenB vaccination for children who are not covered by national immunisation programmes.

Why do we need MenB vaccines?

MenB is one of the most common causes of life-threatening bacterial meningitis in the UK and Ireland.

Vaccines are the only way to prevent meningitis and have almost eliminated some other causes of this deadly disease. Since the first meningitis vaccine was introduced against Hib meningitis in 1992, many kinds of meningitis have been reduced or have dwindled to a mere handful of cases, including meningitis caused by Hib and MenC.

Thanks to meningitis vaccines, thousands of children are alive today who would otherwise have died or been left seriously disabled from these deadly diseases. The addition of the MenB vaccine has saved even more.

Who else is entitled to the MenB vaccine?

MenB vaccination is available free of charge to people in the UK and Ireland with medical conditions that increase the risk of contracting MenB disease, in some circumstances when people have been in close contact with someone who was ill with MenB meningitis and/or septicaemia, and in occupations which put people at increased risk of disease.

Medical conditions

In the UK it is recommended that people with asplenia, splenic dysfunction or complement disorder, including those on Eculizumab therapy are entitled to receive the vaccine because they are at a higher risk of contracting meningococcal disease https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/554011/Green_Book_Chapter_22.pdf.

In Ireland, in addition to the conditions listed above, it is also recommended that those who are HIV positive and haematopoietic stem cell transplant and solid organ transplant candidates and recipients receive the vaccine http://www.hse.ie/eng/health/immunisation/hcpinfo/guidelines/chapter13.pdf.

Close contacts of a case of MenB disease

In Ireland, MenB vaccine is offered to close contacts when there has been a case of MenB disease. In the UK there is guidance about when the vaccine should be offered to close contacts of people who get meningococcal B disease, see https://www.gov.uk/government/publications/meningococcal-disease-guidance-on-public-health-management

Occupational risk

The vaccine should be offered to laboratory workers who are at risk of exposure to MenB bacteria in their job.

How effective is the MenB vaccine Bexsero?

The effectiveness of a vaccine is determined by many things, including how strong an immune response it produces (its 'immunogenicity'), and how widely it covers disease-causing strains circulating in the country. Other meningococcal vaccines against MenC and

MenACWY cover all strains of those infections. However, MenB vaccine is formulated differently and there are some non-matching MenB strains it cannot cover.

Results from the vaccine trials were very encouraging, showing that the vaccine triggers a strong immune response in infants, toddlers and adolescents[1-3]. The type of circulating strains can vary over time, however research found that the vaccine was predicted to cover 73% of strains circulating in England from 2014 to 2018[4].

The actual proportion of cases prevented will depend on other things too, including how widely the vaccine is offered and taken up, and how long protection lasts.

Real-world evidence following the introduction of the MenB vaccine across various settings shows it is working well. Three years after the programme was introduced to the UK, cases had declined by 75% in age groups eligible for the vaccine and the effectiveness of two doses plus a booster has been estimated to be around 71% against strains predicted to be covered by the vaccine[5]. A review of data from 7 countries with experience of widespread MenB vaccination found vaccine effectiveness ranged from 59% to 100% against circulating MenB strains [6].

Is the vaccine safe?

The safety of routine vaccinations is rigorously monitored in the UK and no safety concerns have been raised since the vaccine was routinely introduced in September 2015.

As with all drugs, vaccines can cause side effects. Vaccine side effects may include soreness/redness/swelling or hardness of skin at the injection site, fever, lack of appetite, muscle aches, irritability, sleepiness and rashes.

There was already strong safety data from clinical trials involving almost 8,000 people, including more than 5000 infants and toddlers to support the introduction of routine vaccination [1-3, 7-9]. The trials demonstrated that Bexsero® has a good safety profile[10] and a review of the data by the European Commission resulted in vaccine licensure in January 2013 on the basis of the benefits of the vaccine outweighing the risks.

Real-world experience of using Bexsero across the world also continues to grow. Safety surveillance from countries that have used the vaccine widely have been consistent with the safety profile reported in clinical trials [6].

Why have I been advised to give my baby paracetamol after vaccination with Bexsero®?

Fever is more common in babies when Bexsero® is given alongside other vaccines. Taking paracetamol as soon as possible after getting vaccinated (or at the same time) reduces the likelihood and severity of fever without affecting the immune response to any of the vaccines[12]. It will also reduce any pain, redness and swelling that vaccination may cause.

More information about giving paracetamol after immunisation with MenB alongside other routine immunisations is available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/450890/9413-paracetamol-menB-2page-A4-05-web.pdf

What are the ingredients in Bexsero?

The active ingredients that equip our immune system to fight MenB bacteria include four main components of meningococcal bacteria[13]. All of these components have been processed and inactivated and are not part of any living bacteria, but can still stimulate the immune system.

Three of them are proteins found on the surface of the bacteria:

- Factor H Binding Protein (fHbp)
- Neisseria Heparin Binding Antigen (NHBA)
- Neisserial Adhesin A (NadA)

These three components help meningococcal bacteria invade and survive within the human body. In vaccinated people, the immune system can recognise and ‘neutralise’ these components, so the bacteria cannot make them ill.

The final ingredient is the New Zealand MenB Vaccine (MenZB) derived from the New Zealand outbreak strain of MenB (strain NZ 98/254).

Other ingredients in the vaccine include:

- Aluminium hydroxide (the active ingredients of the vaccine are adsorbed to this to improve immunogenicity)
- Histidine (used to regulate the PH of the vaccine)

- Sodium chloride
- Sucrose

Used to make an isotonic solution (a solution with a similar salt concentration as cells and blood in the body)

- Water for injections

Are there any safety reasons not to have the vaccine? What about allergies?

People who have previously had an anaphylactic reaction to any of the vaccine components listed above should not get the vaccine.

Anaphylaxis to current vaccines is very rare and is estimated to occur in one in a million doses given, although a recent study[14] found no reports of anaphylaxis following more than 5 million preschool and infant immunisations over an entire year in the UK and Ireland.

People with severe immune system problems cannot have live vaccines, but the new MenB vaccine is not live. Food allergies are not a reason to avoid vaccination. People often worry that eczema, asthma, epilepsy and a family history of reactions to vaccinations are a reason to avoid vaccinations, but this is not true[15].

The tip cap of the syringe may contain natural rubber latex. The risk of developing an allergic reaction is very small, but in case of known severe latex allergy, you should speak to your doctor or nurse before being vaccinated.

Will this vaccine be offered to adolescents free of charge within the health service?

There is no current UK or Irish recommendation for adolescents to be vaccinated.

Typically, meningococcal disease is most common in babies and children under five, with a second peak in adolescence. Studies on cost effectiveness have concluded that incidence in the adolescent age group is too low to justify immunising adolescents on the NHS.

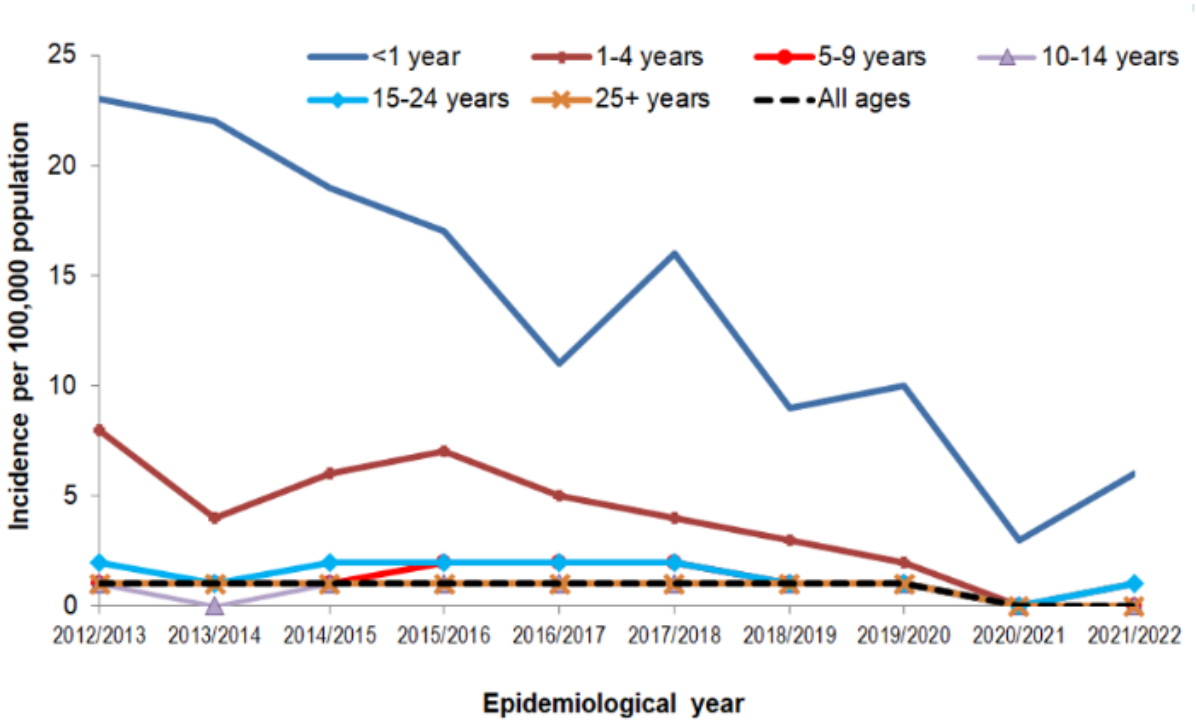

Figure 1: Incidence of invasive meningococcal disease in England:2012/13 to 2021/22. Source UKHSA

My child is too old to qualify for the MenB vaccine on the NHS. Should I get them vaccinated privately?

If your child was born before 1 May 2015 and they are not considered to be at increased risk of disease for medical reasons they are not eligible to receive any vaccine doses on the NHS.

At the time the MenB vaccine was introduced, the peak incidence of disease was at around 5 months of age. This is why the vaccine is offered early at 2 and 4 months followed by a booster at 12 months.

Over the past ten years, the incidence of MenB disease has been steadily declining. Cases reached an all-time low between July 2020 and June 2021 when measures introduced to stop the spread of COVID, such as social distancing and the wearing of face-coverings, led to even fewer cases of meningococcal disease. After the measures were lifted however, cases started to increase. The increase was rapid in adolescents particularly amongst university students. Despite this, incidence in the adolescent age group is not currently considered to be high enough to justify providing a vaccine for this age group free of charge on the NHS.

MenB is a deadly and disabling disease with such a rapid onset that some parents may wish to have their child protected even if the risk of them contracting disease is low. MenB vaccination is available privately for parents who wish purchase it.

How can I get the vaccine for my child if they are not eligible for it free of charge within the health service?

Start by asking your own GP for the vaccine, as if they can provide it, this is likely to be the least costly option. GPs may not be able to offer the vaccine to their own patients, but they may be able to arrange it via another surgery on private prescription. You can also get the vaccine from a travel vaccination clinic in your area, a private GP practice, and some pharmacies also offer the vaccine. **It is worth asking more than one clinic as prices can vary considerably.**

How much will the vaccine cost if I want to get it privately?

As a guideline, the NHS list price of the vaccine is £75 per dose excluding VAT. GPs or clinics can set their own charges for administration – prices in excess of £125/dose are not unusual. More than one dose of the vaccine is needed for sufficient protection – the total number depends on the age of the person being vaccinated.

Table 1 shows the number of doses and the time intervals between doses, as recommended in the Summary of Product Characteristics (part of the licence for Bexsero®).

Table 1: Recommended vaccine dose schedule for Bexsero according to age

Age Group	Primary dose series	Interval	Booster?
2 – 5 months	3	No less than 1 month	Yes, at 12 - 15 months with an interval of at least 6 months after the last primary dose. In case of delay no later than 24 months
3 – 5 months	2	No less than 2 month	
Unvaccinated infants 6 - 11 months	2	No less than 2 month	Yes, at 12 - 23 months with an interval of at least 2 months after the last primary dose
Unvaccinated children, 12 - 23 months	2	No less than 2 month	Yes, between 12-23 months after the last primary dose
Children, 2 - 10 years	2	No less than 1 month	No need yet established
Those over 11 years	2	No less than 1 month	No need yet established

The vaccine is not licensed for children under 8 weeks old because there is not enough information about how well the vaccine works in this age group.

Trumenba®, another MenB vaccine is also available privately for adults and children aged 10 and above (see ‘Are there other MenB vaccines?’ section below).

Why has it been so difficult to develop a MenB vaccine?

Meningitis vaccines developed up to now have been made from a fragment of the bacterial sugar coat. When we are vaccinated our immune system learns to recognise and attack this sugar as a ‘foreign invader’ by producing antibodies which help us destroy bacteria if we come into contact with one with the same sugar coat. However, the sugar coat of MenB

bacteria does not trigger an immune response, because it looks like developing human cells. This means that the immune system does not recognise it as a foreign invader, and this protects it from attack. So using the sugar coat just does not work for MenB vaccine development.

The search for a MenB vaccine has focused on other elements of the surface of MenB bacteria but it has been very difficult to find elements which are both 'visible' to the immune system and present in every MenB strain. Even elements that are usually present are extremely variable, so the immune response against a vaccine made from one kind of MenB may not be capable of killing all the different MenB strains.

Are there other MenB vaccines?

Yes. Another MenB vaccine, Trumenba®, has been developed by Pfizer and was licensed for 10 to 25 years olds in the United States in November 2014. Trumenba was also licensed in Europe in May 2017 for adults and children aged 10 and above.

The active ingredients in Trumenba® include two variants of Factor H Binding Protein (fHbp) which is found on the surface of meningococcal bacteria. fHbp helps the bacteria survive and go undetected in the human body. Vaccination with Trumenba® helps the immune system to recognise fHbp on the surface of invading bacteria and neutralise them before they can cause serious illness.

Trumenba® is licensed to be given in three doses with a 2 month interval between the first two doses and a 4 month interval between doses two and three. Results from seven clinical trials, which vaccinated a total of 4,282 people aged 11 to 25, have shown that the vaccine has a good safety profile.

Real-world experience of using Trumenba® is also growing. In early 2015 there was an outbreak of MenB disease at the University of Oregon, USA. Six cases were confirmed amongst students in January to February, including one death. In response to this, a campus wide vaccination programme aiming to immunise around 24,000 students began in February 2015.

In addition to the universal vaccines Bexsero® and Trumenba®, vaccines covering just one strain of MenB have been used successfully in New Zealand and Cuba in the past to control epidemics caused by a single strain. Our research has helped to show that neither the New

Zealand or Cuban vaccines would cover the majority of MenB infection in the UK and the rest of Europe.

Why aren't the MenB vaccines Bexsero® and Trumenba® expected to cover all cases?

It is impossible to be certain about the precise extent of coverage. Bexsero® is based on four main protein components found on the bacterial surface across most of the hundreds of different MenB strains. Trumenba® is based on 2 versions of one the same surface proteins included in Bexsero®. However, the structure of each protein can vary a lot and some bacteria have more of a particular protein on their surface than others do. The antibodies we produce after we've been vaccinated may not be able to recognise a protein carried on the surface of invading MenB bacteria if its structure is a bit different to the protein in the vaccine, or if there is not very much protein to latch onto. If our antibodies cannot attach to invading bacteria, our immune system will be unable to destroy them.

In the case of Bexsero® in addition to the main four protein components, other ingredients that are part of the vaccine formulation may also produce immunity. This may add to the coverage predicted for the four main vaccine components.

Now that Bexsero® has been introduced in the UK, it is very important to monitor how well it is working and how much of the disease it covers. Meningitis Research Foundation's Meningococcal Genome Library is supporting this happening. https://www.meningitis.org/our-work/action-and-support/mrf-meningococcus-genome-library

Where can I go for further information?

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email **helpline@meningitis.org**
Visit our website and chat with us live **www.meningitis.org**

If using any information from this document in external communications, please credit Meningitis Research Foundation and quote our URL www.meningitis.org.

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