13 Meningococcal Infection

Group C vaccine introduced 2000
Group B vaccine introduced 2016

NOTIFIABLE

In some circumstances, advice in these guidelines may differ from that in the Summary of Product Characteristics of the vaccines. When this occurs, the recommendations in these guidelines, which are based on current expert advice from NIAC, should be followed.

Introduction

Meningococcal infections are the spectrum of disease caused by *Neisseria meningitidis* and include meningitis, septicaemia and, less commonly, other invasive infections such as septic arthritis and endophthalmitis. Meningococci are Gram-negative diplococci and are divided into 13 antigenically distinct serogroups. Most disease-associated strains belong to serogroups A, B, C, Y or W135. In Ireland serogroup B and C strains accounted for over 99% of all meningococcal disease prior to the introduction of serogroup C conjugate vaccine in 2000.

The significance of the meningococcus as a pathogen lies in the potential severity of the illness, the absence of effective vaccines against all meningococcal serogroups, the unique ability of the organism to cause outbreaks or epidemics, and the public anxiety that may follow a case or outbreak. In Ireland most cases of meningococcal infection are sporadic.

Epidemiology

N. meningitidis is a human-only pathogen and is carried in the nasopharynx. Approximately 10% of the population are asymptomatic carriers. Carriage is uncommon in infancy and early childhood with peak carriage rates (up to 25%) occurring in the 15-19 year age group. Transmission occurs from person-

to-person via respiratory droplets, or direct mucosal contact with respiratory secretions of a carrier. Naturally-acquired serum bactericidal antibodies to *N. meningitidis* result from carriage.

A small minority of individuals who pick up *N. meningitidis* develop invasive infection after an incubation period which is typically 1-10 days, usually less than four days. Factors which increase the risk of invasive infection include young age (incidence is highest in infants, followed by children < 5 years of age), active or passive smoking, a preceding severe respiratory tract infection, particularly influenza A, and living in closed or semi-closed communities such as military barracks or halls of residence, often in the setting of dormitory accommodation.

Individuals with complement or properdin deficiencies and those with functional or anatomic asplenia and hyposplenism have an increased risk of invasive and/or recurrent meningococcal disease.

Individuals with C3 defects are at risk of severe infection with any meningococcal strain. Meningococcal disease in those with C5-C8 deficiencies is almost always caused by serogroup W135, Y or 29E, and is typically recurrent.

Individuals who have had recurrent meningococcal infections should be tested for complement and properdin deficiency; investigations should ideally be performed some weeks following infection. Properdin deficiency is a very rare X-linked defect. Screening for properdin deficiency should be considered when there is a family history of meningococcal disease occurring in accordance with an X-linked pattern (many males affected).

Meningococcal disease occurs in all countries. The infection is endemic in Northern Europe, with a background incidence of 2-3 culture confirmed cases per 100,000 per annum in the pre vaccine era. Periodic upsurges in meningococcal activity resulting in hyperendemic disease occur, associated with distinct subtypes and/or a hypervirulent strain or strains.

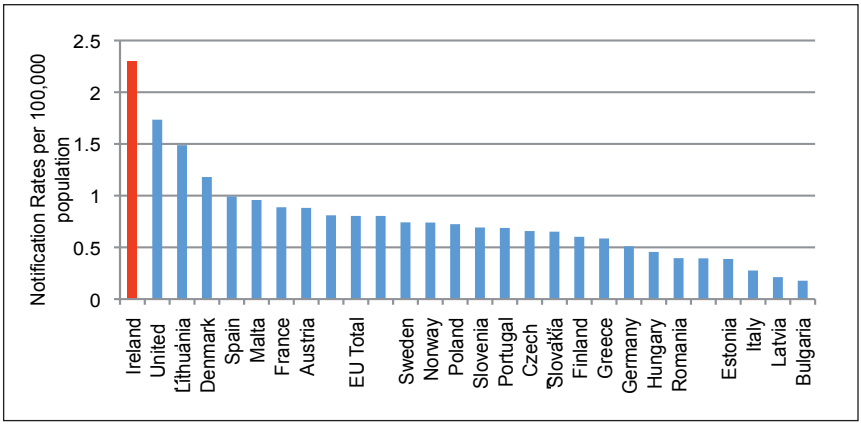
Epidemic disease is characterised by an increased case-attack rate and altered age distribution, with increased numbers of cases seen in adolescents and adults. Examples include large epidemics involving serogroup A or serogroup W135 strains in association with the annual pilgrimage (Hajj) to Mecca, with importation into other countries by returning pilgrims.

The highest burden of disease is in the 'meningitis belt' of sub-Saharan Africa, due mainly to serogroup A or W135, with attack rates of up to 1/1,000 and reported mortality rates of up to 40%. Epidemic disease with serogroup B strains has also occurred, including in Norway in the 1970s and in New Zealand from 1991 to 2006.

In Ireland the majority of infections occur in winter and early spring. Meningococcal disease may occur at any age but sporadic infection is most common in infancy and early childhood, with a second smaller peak of incidence in adolescents and young adults.

Ireland has one of the highest notification rates of invasive meningococcal disease (IMD) in Europe based on confirmed cases in the EU/EEA, 2008-2012 (Figure 13.1).

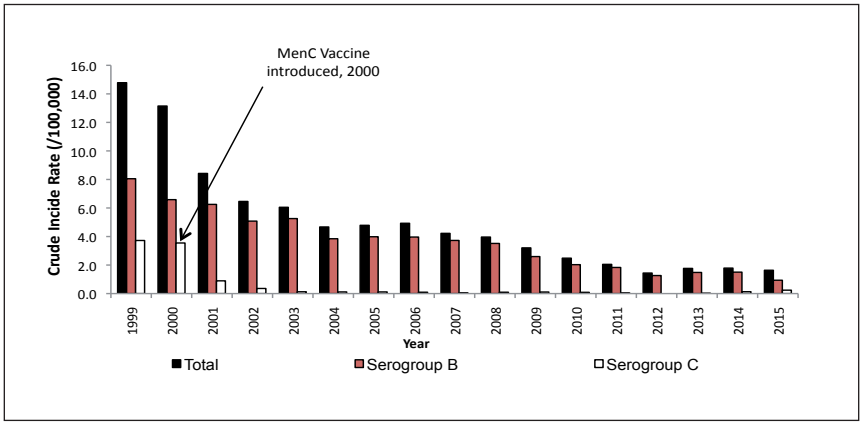
Figure 13.1 Notification rates of invasive meningococcal disease (IMD) in Europe based on confirmed cases in the EU/EEA, 2008-2012
Source: HPSC



Since the introduction of the N. meningitidis serogroup C conjugate (MenC) vaccine, meningococcal B disease has been the predominant cause of invasive meningococcal disease in Ireland (Figure 13.2).

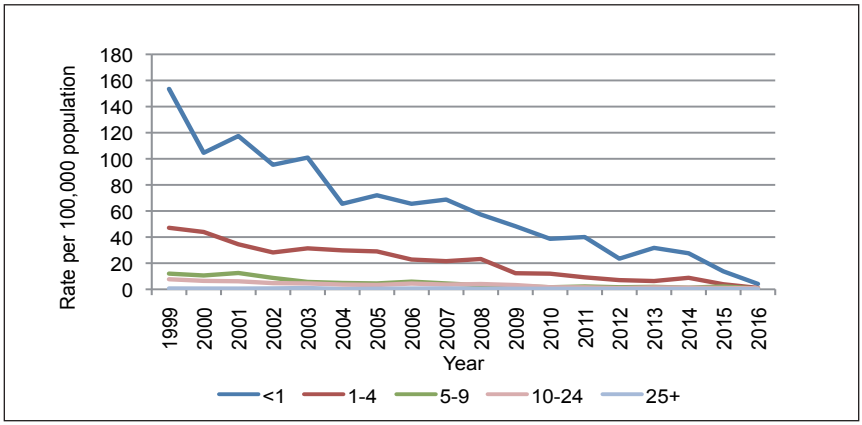
Chapter 13 Meningococcal Infection

Figure 13.2. Crude incidence rate of IMD in Ireland, 1999-2015.
Source: HPSC



In Ireland, the rate of invasive Meningococcal B disease has been steadily decreasing (Figure 13.3). In 2015 the age specific incidence rate (ASIR) among infants for Meningococcal B disease, less than one year of age, was 13.8/100,000. In the 1-4 year age group it was 3.87/100,000. The case-fatality rate from invasive Meningococcal B disease is less than 5%.

Figure 13.3. Age specific incidence rate of invasive Meningococcal B disease in Ireland, 1999-2015.
Source: HPSC



Effects of meningococcal disease

The onset of disease may be fulminant, with abrupt onset of fever, a rapidly progressing purpuric rash, prostration, shock and death; or it may be insidious, with a mild upper respiratory prodrome of 2 or 3 days. In an infant or young child the common early symptoms (reluctance to feed, fever and irritability) are non-specific. Clinical recognition of meningococcal disease in the initial phase of the illness may be difficult.

The skin may appear blotchy or pale. A typical non-blanching petechial or purpuric rash may be present with meningococcal septicaemia; however, the rash may be very scanty and may initially be erythematous.

Most children admitted to hospital have non-specific symptoms in the first 4-6 hours. Early symptoms of sepsis (leg pains, cold hands and feet, abnormal skin colour) are usually present at a median time of 8 hours. The classic features of haemorrhagic rash, meningism and impaired consciousness develop later (median onset 8-10 hours. in young children, but later in older children). The signs and symptoms of meningococcal meningitis are indistinguishable from those of bacterial meningitis caused by other pathogens, with the exception of the rash, which is present in some 40% of patients.

Mortality rates are from 5 to 15%, with 10-15% suffering permanent disability. Mortality rates are higher in individuals with septicaemia than in those with meningitis alone. Complications in survivors include skin scarring, digit and/or limb amputation, seizures, hearing loss, intellectual deficits and chronic renal failure.

Management of suspected cases, contacts, carriers and outbreaks

National guidance on the management of meningococcal infection can be located on the HPSC website at www.hpsc.ie

Initial management of suspected cases

Primary care

In view of the often rapid progression and high mortality rate of meningococcal disease, early treatment of suspected cases with penicillin (unless contraindicated) may be life-saving.

Recommended initial dose of Benzyl penicillin

Adults and children ≥10 years	1,200 mg
Children 1-9 years	600 mg
Children <1 year	300 mg

This should be given intravenously. It can be given by the intramuscular route but is not as effective in shocked patients.

Hospital care

Each acute hospital should have readily available guidelines in place for the management of suspected invasive meningococcal disease.

Chemoprophylaxis

Advice should be sought from the local Department of Public Health for management of contacts and suspected outbreaks.

Close contacts of all individuals with invasive meningococcal disease are at increased risk of developing infection. This risk is highest in the first 7 days following onset of symptoms in the index case, and falls during the following weeks. If prophylaxis is not given, the absolute risk to an individual in the same household one to 30 days after an index case becomes ill is about one in 300. The aims of chemoprophylaxis are to eliminate carriage from recently colonised susceptible individuals before disease may develop, and to reduce spread of the organism.

Chemoprophylaxis should be given as soon as possible after notification of the index case**,** preferably within 24 hours of diagnosis but can be given up to 1 month later if a contact is not immediately identified or traced.

Chemoprophylaxis is not routinely required for contacts on public transport.

The following persons should be given chemoprophylaxis:

1. The index case, unless the disease was treated with ceftriaxone. Begin chemoprophylaxis before discharge from hospital.

2. Those who, in 7 days prior to the onset of illness of the index case
   - shared living or sleeping accommodation with the index case; this includes child-minders and baby-sitters
   - had mouth kissing contact with the index case
   - were in the same nursery/crèche as the index case, where the nature of nursery/crèche contact is similar to that for household contacts. This includes adult carers.

3. Health Care Workers (HCWs) (including those present at autopsy) whose mouth and nose is directly exposed to respiratory droplets or secretions of a probable or confirmed case of meningococcal disease within 24 hours of the commencement of antibiotics i.e. those carrying out high risk procedures and when within one metre of a patient. High risk procedures are those which may result in generation of respiratory droplets (such as may occur during intubation, naso-pharyngeal or tracheal suctioning) within 24 hours of commencement of appropriate systemic antibiotics.

HCWs should wear masks (surgical or shield as appropriate) when in close contact with an infectious case in the 24 hours after starting antibiotic treatment.

Chemoprophylaxis (and vaccination) is not recommended without a clear history of such high risk exposure.

Health care workers (HCWs) are not considered to be at particularly increased risk of disease unless directly exposed to large particle droplets/ secretions from the respiratory tract of a case within the period of infectivity.

4. Chemoprophylaxis is not necessary for classmates of an index case unless a number of cases occur during the same term.
   - If two or more cases of infection with the same strain occur in one class all class members and staff should receive prophylaxis
   - If the cases occur in different classes, management is more difficult but should be guided by such considerations as
     - the interval between the cases
     - the size of the contact group
     - the carriage rate in the school
     - whether the cases are due to a vaccine-preventable strain
     - the degree of public concern, particularly if a death has occurred
     - the incidence of the disease in the wider community.

5. Special consideration is needed when an index case has attended a house party for four or more hours in the preceding 7 days, especially if pre-school children were present. If chemoprophylaxis is appropriate it should be given to all attendees, both adults and children.

6. Special consideration should be given when there is greater than usual interaction between members of the extended family and an index case, particularly where overcrowding or adverse environmental living conditions exist.

Prophylactic antibiotics

All close contacts should be advised that infection can occur even if prophylaxis is given. This is because the antibiotic may not be effective if the contact is incubating disease, or because the contact may become recolonised and then develop the disease. Contacts should be advised to seek medical advice should symptoms develop.

Rifampicin

Dose

Children 0-<12 months	5 mg/kg 12 hourly for 2 days
Children 1-12 years	10 mg/kg 12 hourly for 2 days
All over 12 years	600 mg 12 hourly for 2 days

Rifampicin recipients should be informed about the following possible side-effects:

- interference with contraceptive pill
- interference with anticoagulants
- red colouration of urine, sweat and tears
- permanent discolouration of soft contact lenses

Alternative prophylaxis

Ciproflaxacin

- A single dose of ciprofloxacin (20 mg/kg, max 500 mg orally). Ciprofloxacin is the preferred chemoprophylaxis agent for women on the contraceptive pill. It may be used as an alternative to Rifampicin.

Ceftriaxone

- Ceftriaxone as a single intramuscular dose (250 mg in adults). Ceftriaxone may be used in pregnancy.

For more details see Guidelines for the Early Clinical and Public Health Management of Bacterial Meningitis (including Meningococcal Disease) available at http://www.hpsc.ie/hpsc/A-Z/VaccinePreventable/BacterialMeningitis/Guidance/File,12977,en.pdf

Meningococcal vaccines

Conjugate vaccines induce a better immune response than polysaccharide vaccines. Polysaccharide meningococcal vaccines are no longer recommended. Licenced conjugate vaccines are:

1. Meningococcal ACWY vaccine (MenACWY)
2. Meningococcal B Vaccine (MenB)
3. Meningococcal C vaccines (MenC, Hib/MenC)

A list of the vaccines currently available can be found at www.hpra.ie

A list of the vaccines currently available from the National Cold Chain Service can be found at www.immunisation.ie

All meningococcal vaccines listed above should be stored at +2 to +8ºC.

1. Meningococcal ACWY vaccine (MenACWY)

Two conjugate MenACWY vaccines made from group A, C, W and Y capsular polysaccharides are available. The protein conjugates are either CRM197 (Menveo) or tetanus toxoid (Nimenrix). One to two doses are recommended.

Menveo is indicated for the immunisation of children from 2 years of age and adults at risk of exposure to N. meningitidis groups A, C, W and Y, to prevent invasive disease. It may be given to those aged 2 months to< 2 years of age who are at risk of exposure to groups A, C, W and Y. One to two doses are recommended (see Table 13.1).

Nimenrix is indicated for the immunisation of children from the age of 12 months and adults against invasive meningococcal diseases caused by N. meningitidis group A, C, W and Y. One to two doses are recommended.

Table 13.1 Meningococcal ACWY vaccine schedule by age and vaccine

Vaccine	Menveo	Nimenrix
Age	**From 2 months**	**From 12 months**
2-<12months	2 doses[1] • 1 dose under 12 months • 1 dose over 12 months at least 2 months after the last dose	Not recommended
1year and older	1 dose	
	Either vaccine may be given if previously vaccinated with MenACWY polysaccharide vaccine	

NOTE:

[1] Men ACWY conjugate vaccine can replace the MenC if the child requires Men ACWY conjugate vaccine at the same time as the routine MenC vaccinations. If MenC already given leave at least 2 months between the vaccines. If MenACWY already given MenC at 6 months not required.

Immunocompromised persons at increased medical risk may need additional doses. For details see Chapter 3.

Those vaccinated with polysaccharide quadrivalent vaccine should receive a dose of conjugate vaccine if further doses are required (travel or at risk condition)

2. Meningococcal group B vaccine (MenB)

This is a recombinant multicomponent meningococcal B vaccine (Bexsero). It is indicated for active immunisation of individuals from 2 months of age and older against invasive meningococcal disease caused by *Neisseria meningitidis* group B. There are no data on its use in adults older than 50 years of age, but it is recommended for at-risk persons aged over 50 years. Two to three doses are recommended (Table 13.2).

Table 13.2 Meningococcal B vaccine routine and catch-up schedules

Routine schedule		Catch up schedule		
Age	**Number of doses**	**Age**	**Number of doses**	**Schedule**
2 months	1 dose	2 - <10 months	3 doses	2 doses 2 months apart and booster at 12 months
4 months	1 dose	10 months - <12 months	2 doses	1 dose and booster at 12 months or older, 2 months after the first dose
12 months	1 dose	12 months and older	2 doses	2 doses 2 months apart

3 Meningococcal C vaccine (MenC)

Menjugate and Meningitec are made from meningococcal C capsular polysaccharide conjugated to CRM-197 protein. NeisVac C contains meningococcal C polysaccharide conjugated to tetanus toxoid. These 3 MenC vaccines induce a T-cell dependent memory response from 6 weeks of age and are indicated for immunisation of infants from the age of 2 months, children and adults.

Menitorix (Hib/MenC) contains Haemophilus type b and Neisseria meningitidis group C polysaccharides conjugated to tetanus toxoid. It can be given from 2 months to 10 years of age for the prevention of invasive diseases caused by Haemophilus influenzae type b (Hib) and Neisseria meningitidis group C (MenC).

There is evidence that there is a satisfactory primary immune response to one

MenC dose in infants. However, because of waning immunity, booster doses are necessary. The recommended schedule is 3 doses (4 months, 13 months and 12-13 years of age) (Table 13.3).

Table 13.3. Routine and catch up schedule for Meningococcal C vaccine

Routine schedule		Catch up schedule	
Age	**Number of doses**	**Age**	**Number of doses**
6 months	1 dose*	5 - <12 months	1 dose*
13 months	1 dose (as Hib/MenC)	13 months - <12 years	1 dose
12 -13 years	1 dose	12 - <23 years	1 dose if not previously vaccinated at >10 years of age

*Meningitec does not provide adequate protection in infancy and is not recommended for use <12 months.

Dose and Administration

The dosage of all meningococcal vaccines is 0.5 ml, given by intramuscular injection in the anterolateral thigh or the deltoid region.

The MenB vaccine given at the 2 and 4 month visits should be given in a different limb from the other childhood vaccines when possible.

Prophylactic paracetamol is recommended when MenB vaccine is given at 2 and 4 months as part of the Primary Childhood Immunisation schedule, to decrease the risk of fever (see Adverse Reactions below).

Indications

1. Children (routine)

MenB vaccine is recommended as a primary course at at 2 and 4 months with a booster at 12 months of age.

MenC vaccine is recommended as a primary course at 4 months with boosters at 13 months and 12-13 years of age.

2. Unvaccinated

MenB vaccine (Table 13.2)

Age 2 - < 10 months

2 doses are recommended 2 months apart with a booster at 12 months (at least 2 months after previous dose).

Age 10 - < 12 months

1 dose is recommended with a booster at 12 months or older, 2 months after the first dose.

MenC vaccine (Table 13.3)

Age 12 months and older

2 doses are recommended 2 months apart.

Age 12 months - <12 years of age

1 dose is recommended.

A child who has had a MenC containing conjugate vaccine (MenC or MenACWY) at 10 years or older does not need an adolescent booster because they have adequate levels of antibody which should persist until adulthood.

Age 13 to <23 years

1 dose is recommended.

3. Those at increased risk

> Vaccination should ideally be completed at least two weeks prior to splenectomy, transplant, or commencing immunosuppressant treatment.

3.1 MenACWY vaccine is recommended for the following

- Functional or anatomic asplenia or hyposplenism (including splenectomy, haemoglobinopathies, and coeliac disease)
- Complement or properdin deficiency
- Down syndrome
- Immunodeficiency due to disease or treatment (including Eculizumab (Soliris) treatment)
- Haematopoietic Stem Cell Transplant (HSCT)
- Solid organ transplant (SOT) candidates and recipients

The number of doses depends on the age of first administration of vaccine, the indication and whether at continued risk of infection.

Functional or anatomic asplenia or hyposplenism (Table 13.1)

For children < 4 to <12 months: 3 doses of MenACWY are recommended: 2 doses 2 months apart with the 3rd dose given at 13 months and at least 2 months after the 2nd dose.

Those 1 year and older at presentation should receive two doses MenACWY two months apart regardless of meningococcal vaccination history.

If MenC vaccine has been given, MenACWY vaccine should be delayed for at least 2 months.

Complement or properdin deficiency
Two doses of MenACWY are recommended two months apart regardless of meningococcal vaccination history.
Immunodeficiency due to disease or treatment
Two doses of MenACWY are recommended two months apart regardless of meningococcal vaccination history.

Down syndrome
Two doses of MenACWY are recommended two months apart regardless of meningococcal vaccination history.

Patients on Eculizumab (Soliris)
For those who have received MenC, one dose of MenACWY is recommended, two months after MenC vaccine.

Those not previously immunised with MenC vaccine should be given two doses of MenACWY two months apart.

Those who have previously received MenACWY polysaccharide vaccine should be given two doses of conjugate MenACWY at least 12 months after the MenACWY polysaccharide vaccine.

Haematopoietic Stem Cell Transplant (HSCT)
Three doses of conjugate MenACWY are recommended two months apart following bone marrow transplant (see Table 3.1 in Chapter 3).

Solid organ transplant (SOT) candidates and recipients
Pre-transplant- patients should receive MenACWY at least 2 weeks pre-transplant. Those who received MenACWY pre-transplant should be re-immunised with 3 doses at 2-month intervals, starting no sooner than 6 months post transplant. Those who did not receive MenACWY pre-transplant should be immunised post-transplant with three doses at 2-month intervals, with at least 2 months between doses, starting no sooner than 6 months post transplant.

3.2 MenB vaccine is recommended for the following

- Functional or anatomic asplenia or hyposplenism (including splenectomy, haemoglobinopathies, and coeliac disease)
- Complement or properdin deficiency
- Down syndrome
- Immunodeficiency due to disease or treatment (including Eculizumab (Soliris) treatment)
- Haematopoietic Stem Cell Transplant (HSCT)
- Solid organ transplant (SOT) candidates and recipients

See Table 13.3 for number of doses.

4. Index cases

4.1 Serogroup A, W, or Y disease

MenACWY vaccine is recommended for index cases to provide protection against all four serogroups, even though recurrent meningococcal infection is rare.

For an index case who received MenACWY vaccine more than 12 months previously a booster dose may be indicated following consultation with relevant specialist.

4.2 Serogroup B disease

MenB vaccine is recommended for index cases of any age who have not previously received Men B vaccine.

43 Serogroup C disease

MenC vaccine is recommended for index cases unless they have an increased risk of disease, in which case MenACWY is indicated.

See Tables 13.1, 13.2 and 13.3 for detail on vaccine and doses.

5 Contacts of cases

Close contacts of cases of meningococcal infection have an increased risk of developing the disease in subsequent weeks and so should be given appropriate vaccination as below:

5.1 Serogroup A, W or Y disease.

MenACWY vaccine is recommended for all close contacts of any age, in addition to chemoprophylaxis. Depending on the age of the close contact one or two doses may be indicated (Table 13.1).

Those who received the conjugate MenACWY vaccine more than 12 months previously should be considered for a booster dose if at ongoing risk of meningococcal infection.

5.2 Serogroup B disease
In addition to chemoprophylaxis, immunisation with ***MenB vaccine*** is recommended for all previously unimmunised close contacts of meningococcal B disease

5.3 Serogroup C disease
MenC vaccine is recommended for all previously unimmunised close contacts from 6 weeks of age in addition to chemoprophylaxis. Close contacts who are partially immunised should complete the course of vaccine.

Those who completed a course more than one year before should be offered a booster.

6 Cluster/outbreaks
Immunisation has been shown to be effective in controlling outbreaks in institutions (e.g. schools) and communities, reducing the incidence of infection.

6.1 Serogroup A, W and Y disease
In the event of a cluster/outbreak of serogroup A, W or Y disease ***MenACWY vaccine*** is recommended for all close contacts that have not already been immunised with a conjugate ***MenACWY vaccine*** Depending on the age of the close contact one or two doses are required(Table 13.1).

There is currently no information on the need for booster doses for anyone who received conjugate MenACWY vaccine more than 12 months previously.

6.2 Serogroup B disease
Immunisation with ***MenB vaccine*** may be considered to control clusters or outbreaks of meningococcal B disease.

6.3 Serogroup C disease
In the event of a cluster/outbreak of serogroup C disease, ***MenC vaccine*** is recommended for all unimmunised or partially immunised close contacts.

Close contacts of any age who were only immunised in infancy and those who completed the recommended immunisation course (including the 13 month booster) more than one year previously should be offered an extra dose of MenC vaccine.

7 Travel (see Chapter 5 for further details)

MenACWY vaccine is indicated for immunisation of individuals travelling to high risk areas where epidemics or hyperendemic disease with serogroup A, C, W or Y infection occur. At present these areas include sub- Saharan Africa and the Kingdom of Saudi Arabia (for the latter, MenACWY vaccination is a visa entry requirement).

For those 2-<12 months of age: give a dose of Menveo instead of MenC if the timing coincides with the normal Men C vaccination. If MenC vaccine has already been administered, give one dose of Menveo vaccine at least 4 weeks after MenC, and a booster dose one month later.

For those 12 months and older: only one dose of MenACWY vaccine is recommended.

For those in a medically at risk group who have had one dose of conjugate MenACWY an additional dose is recommended if travelling to a high-risk area, at least 4 weeks (preferably 8 weeks) after the first dose.

From time to time, meningococcal disease outbreaks occur in various parts of the world. Where such outbreaks are due to vaccine-preventable strains, vaccination may be recommended for some travellers to the affected areas. The advice of an appropriate Specialist in Public Health Medicine or Infectious diseases should be sought.

Note: Visa entry requirements should be checked in good time prior to travel to individual countries.

Booster doses

MenACWY vaccine

A booster dose is recommended for children vaccinated in the first year of life who are at continued risk of infection. For vaccinated individuals at increased risk of meningococcal disease due to asplenia or hyposplenism, complement or properdin deficiency or other immunodeficiency, a second dose is recommended. The need for further booster doses has not been determined (Table 13.1).

MenB vaccine

The need for further booster doses has not yet been determined.

MenC vaccine

Booster doses are routinely recommended at 13 months and 12 years of age for children vaccinated in the first year of life.

Contraindications
Anaphylaxis to any of the vaccine constituents.

Precautions
Acute severe febrile illness, defer until recovery.

Pregnancy and breastfeeding: Meningococcal vaccines may be given to pregnant or breastfeeding women.

There is no evidence of risk from vaccinating pregnant women or those who are breast-feeding with inactivated virus or bacterial vaccines or toxoids.

The tip cap of the MenB and MenC syringe may contain natural rubber latex. Although the risk for developing allergic reactions is very small, healthcare professionals should consider the benefit-risk prior to administering this vaccine to subjects with known history of hypersensitivity to latex.

Co administration with other vaccines
MenB vaccine can be given at the same time as other live and non-live vaccines. Men B vaccine should be given in a different limb.

Adverse reactions
MenACWY vaccine
Local: Very common or common reactions include injection site pain and erythema.

General: Very common or common reactions include headache, and nausea. Infants and younger children may develop irritability, reduced feeding and sleep disturbance.

Men B vaccine
Local: Tenderness, pain, swelling, hardness and redness at the injection site are very common.

General: Children up to 10 years of age: fever, loss of appetite, sleepiness, unusual crying, diarrhoea, vomiting, rash and irritability are very common. Adolescents and adults: headache, nausea and malaise, myalgia and arthralgia.

Prophylactic use of liquid infant paracetamol for MenB vaccine
Prophylactic use of paracetamol at the time of or closely after MenB vaccination is recommended as there is a high incidence of fever >39°C when

MenB vaccine is given with other childhood vaccines to infants aged <12 months.

This has been shown to reduce the incidence and severity of fever in these infants by up to 50%.

> There is no evidence of a decrease in the immune response when paracetamol is given with MenB vaccine and the other primary childhood immunisations.

Infants should be given three doses of liquid infant paracetamol 4-6 hours apart after MenB vaccine given at 2 and 4 months (Table 13.4).
The first dose (2.5 ml / 60 mg) is recommended at or just after the vaccine is given.

Table 13.4 Liquid infant paracetamol dosage and schedule after MenB vaccine

Liquid Infant Paracetamol (120mgs/5ml)		2 month visit	4 month visit
Dose 1	2.5mls (60mg)*	At the time of injection	At the time of injection
Dose 2	2.5mls (60mg)*	4-6 hours after dose 1	4-6 hours after dose 1
Dose 3	2.5mls (60mg)*	4-6 hours after dose 2	4-6 hours after dose 2

*A child weighing less than 3.5kg at the 6-week check should be reweighed at the time of vaccination. Any child weighing less than 4kg should be given paracetamol at a dosage of 15 mg /kg.

If a fever >39°C persists a fourth dose (2.5 ml / 60 mg) may be given 4-6 hours after Dose 3. A post vaccination fever may still develop after paracetamol administration but this is less severe and not as long lasting.

> Prophylactic paracetamol is not recommended after MenB vaccine at 12 months or later as the rate of fever is similar to that of the other routine childhood vaccines.

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