Neisseria meningitidis invasive disease

Epidemiology in New Zealand

Despite rates dropping significantly in recent years since the meningococcal B epidemic and vaccination programme, there are still a number of cases of invasive meningococcal disease in New Zealand each year and sometimes community outbreaks. As with the epidemiology in other temperate climates, there tends to be a seasonal pattern, with more cases seen in winter and spring.

More detailed epidemiological information is available on the Institute of Environmental Science and Research (ESR) surveillance website at www.surv.esr.cri.nz.

Case definition

Clinical description

Meningococcal disease is a serious invasive disease with an acute onset and may start as a mild flu-like illness and rapidly progress to fulminant septicaemia and death. Cases typically experience acute fever, malaise, nausea, myalgia, arthralgia and prostration. A rash occurs in about two-thirds of cases – this may be ill defined and macular, petechial or purpuric. More severe infection leads to shock, disseminated intra-vascular coagulation (DIC), acrocyanosis and multi-organ failure.

Approximately 75 percent of cases with invasive disease have meningitis (typically causing headache, photophobia and neck stiffness). Infants present with less-specific features.

Other locations of invasive disease with Neisseria meningitidis are possible though rare, such as orbital cellulitis, septic arthritis, and pericarditis.

Nasopharyngeal carriage of meningococci is relatively common, in roughly 15 percent of the population, and is generally more prevalent in young adults, people who are living in conditions of severe overcrowding (Baker et al 2000), smokers and military recruits.

The events that cause meningococcal disease are poorly understood but include a combination of organism, host and environmental factors (Stephens 1999).
Laboratory tests for diagnosis

Laboratory confirmation requires at least one of the following:

- isolation of Neisseria meningitidis bacteria or detection of Neisseria meningitidis nucleic acid from blood, cerebrospinal fluid (CSF) or other normally sterile site (for example, pericardial or synovial fluid)
- detection of gram-negative intracellular diplococci in blood or CSF or skin petechiae
- detection of meningococcal antigen (latex agglutination test) in CSF.

Case classification

- **Under investigation:** A case that has been notified, but information is not yet available to classify it as probable or confirmed.
- **Probable:** A clinically compatible illness.
- **Confirmed:** A clinically compatible illness that is laboratory confirmed.
- **Not a case:** A case that has been investigated and subsequently found not to meet the case definition.

Although not meeting the definition of a confirmed case, meningococcal infection of the conjunctiva is considered an indication for public health action because of the high immediate risk of invasive disease (refer Health Protection Agency 2011). Other sites may also require public health follow-up on a case-by-case basis, as determined by the local medical officer of health.

Spread of infection

Incubation period

2–10 days, commonly 3–4 days.

Mode of transmission

Transmission is from person to person through droplets or secretions from the upper respiratory tract, from a carrier or case.

Period of communicability

Therapy with rifampicin, ceftriaxone or ciprofloxacin eradicates N. meningitidis from mucosal surfaces within 24 hours, and the case is no longer considered infectious.

Notification procedure

Attending medical practitioners or laboratories must immediately notify the local medical officer of health of suspected cases. Notification should not await confirmation.
Management of case

Investigation
Obtain a history of vaccination and possible contacts.

Obtain a history of any antibiotic treatment, to help clarify if there may be partially treated disease.

Ensure laboratory confirmation has been attempted, including strain identification (group and subtype).

Restriction
Droplet precautions until 24 hours after the start of ceftriaxone, rifampicin or ciprofloxacin. Close contacts do not require isolation even if they are taking prophylaxis.

Pre-hospital treatment
Parenteral antibiotics should be administered to all cases as soon as meningococcal disease is suspected before admission to hospital or in hospital if delays and assessment in hospital are likely to be more than 30 minutes. See the latest edition of the *Immunisation Handbook* (Ministry of Health 2011), available at www.health.govt.nz

Eradication of carriage
It is important that the case receives an antibiotic that will eliminate throat carriage before discharge from hospital, usually rifampicin, ciprofloxacin or ceftriaxone. Unless one of these has been used in the course of treatment, it should be prescribed for the index case before discharge.

There are currently no specific recommendations for vaccinating cases with meningococcal vaccine, other than the general immunisation recommendations – see ‘Health education’ below and the *Immunisation Handbook* (Ministry of Health 2011).

Counselling
Advise the case and their caregivers of the nature of the infection and its mode of transmission.

Management of contacts

Definition
Anyone who has had unprotected contact with upper respiratory tract or respiratory droplets from the case during the 7 days before onset of illness to 24 hours after onset of effective treatment.
Public health follow-up is most important for household contacts and contacts that have had similarly close exposure. Examples of such contacts are:

- those sleeping at least one night in the same household, dormitory, military barrack, student hostel bunkroom (not residents of nursing or residential homes who sleep in separate rooms) as the case or who have been in a seat adjacent to the case in a plane, bus or train for more than 8 hours
- health care workers who have had intensive unprotected contact (not wearing a mask) with a case during intubation, resuscitation or closely examination of the oropharynx
- exchange of upper respiratory tract secretions, including intimate kissing
- other contacts as determined by the medical officer of health on a case-by-case basis, such as children and staff attending an early childhood service

Note: Unless one of these criteria is met, low-level salivary contact such as kissing on the cheek or mouth or sharing food or drink does not require public health follow-up or treatment (given evidence that it does not increase risk of transmission).

**Post-mortem**

If the case has been treated with an effective antibiotic for at least 24 hours before death, any contact risk is low. If the case has not been treated, then occupational contacts should follow routine infection control practices with additional droplet and contact precautions.

Kissing the body is not considered a risk. Body bags are not necessary, and transport to other countries for burial or cremation does not pose a risk. There is no restriction on embalming.

**Laboratory workers**

Laboratory workers who handle high concentrations or large quantities of organisms or are routinely exposed to isolates should be protected with the quadrivalent vaccine.

**Investigation**

Nil. Routine throat or nasopharyngeal culture of contacts is not recommended because asymptomatic carriage is common.

**Restriction**

Nil.

**Antimicrobials**

Antibiotic prophylaxis should be given as soon as possible (ideally within 24 hours) after the diagnosis of the index case. After 24 hours, chemoprophylaxis (and vaccine if appropriate) should still be considered for close contacts; however, there is little value
in offering this more than 14 days after the diagnosis of illness (there is a low risk of further cases after this period, see CDC 2005b).

The purpose of antibiotic prophylaxis is to eradicate nasopharyngeal colonisation by meningococci and thus prevent transmission to other susceptible people. Prophylaxis will not treat illness that the person may be incubating, so it is essential that the contacts be advised to seek urgent medical attention if they become unwell.

**Options**

**Rifampicin**
- Children under 1 month old: Rifampicin 5 mg/kg twice daily for 2 days.
- Children over 1 month old, and adults: Rifampicin 10 mg/kg (maximum 600 mg) twice daily for 2 days.
- Avoid rifampicin if pregnant or breastfeeding.

**Ceftriaxone**
- 125 mg for children under 12 years of age, and 250 mg for older children and adults, intramuscularly as a single dose. This is the preferred prophylaxis for women who are pregnant or breastfeeding. Do not use in infants under 4 weeks of age.

**Ciprofloxacin**
- 500 mg or 750 mg orally as a single dose for adults, except pregnant and lactating women. This is the preferred prophylaxis for women on the oral contraceptive pill. Also preferable for prophylaxis of large groups.

Consult Medsafe data sheets for appropriate use and dosages of ciporofloxacin in children. Treatment in children should only be initiated after careful benefit/risk evaluation, due to possible adverse events related to joints and surrounding tissues. It may be useful in children when no other acceptable alternative therapy is available (Ministry of Health 2011) and it has now been recommended in all age groups (and pregnant women) in the UK guidelines (Health Protection Agency 2011).

**Immunisation**

Immunisation is recommended for unimmunised contacts (as defined above) of a case of group A, C, W135 and Y disease, preferably within 1 week of diagnosis of the index case, but can be considered up to 4 weeks. Ideally the strain, or at least the group, should be determined first; therefore timely laboratory results are important. If there are delays in grouping or this is not possible, consider using a quadrivalent vaccine (if over 2 years of age).

---

1 Both 500 mg and 750 mg tablets are available, and evidence does not clearly favour either dose.
Conjugate vaccine is the preferred type of vaccine for contacts of meningococcal C disease (conjugate vaccine is currently only available for group C in New Zealand), or if the contact is younger than 2 years old. Conjugate vaccine has been shown to reduce nasopharyngeal carriage.

Polysaccharide quadrivalent vaccine is available against group A, C, W135 or Y disease, and can be given to contacts who are more than 2 years old.

Current meningococcal vaccines have short-term efficacy, estimated to be around 3 to 5 years.

Discuss immunisation in the outbreak setting with the Ministry of Health Communicable Diseases and Immunisation Teams.

**Revaccination**

Information on revaccination is limited, but it may be appropriate for individuals with ongoing higher risk. See the *Immunisation Handbook* (Ministry of Health 2011) for more details.

**Counselling**

All contacts should be encouraged to seek medical advice if symptoms develop, especially fever and petechial rash.

**Other control measures**

**Management of contacts when there are large groups involved**

In instances where large groups of people have been exposed to a case, it is likely that contacts will have returned to a variety of health districts. Any follow-up needs to be coordinated by the appropriate medical officer of health to ensure that districts provide consistent advice and treatment.

**Definitions**

- **Outbreak**: Two or more cases of disease associated in time, place or person.
- **Sporadic case**: A single case in the absence of a previous known contact with another case.
- **Primary case**: A case that occurs in the absence of previous known close contact with another case.
- **Co-primary case**: A close contact who develops the disease within 24 hours of onset of illness in the primary case.
- **Secondary case**: A close contact who develops the disease more than 24 hours after onset of illness in the primary case where the microbiological characteristics of the organism are the same.
Organisation outbreak: Two or more cases of the same strain (group and serotype) occurring within a 4-week period at the same early childhood service, school, sports group, social group, nursing home, university, etc.

Community outbreak: Three or more confirmed cases of the same strain (group and serotype) within a 3-month period and an age-specific incidence or specific community population incidence of approximately 10 per 100,000, where there is no other obvious link between the cases (this is not an absolute threshold). The numerator is defined by the number of unlinked cases (that is, they are not close contacts of each other and do not share a common affiliation). The denominator is defined as the population at risk that makes best sense in terms of population residence and movement, and therefore transmission of meningococcal bacteria.

Identification of source
Check for other cases in the community. Do not perform screening cultures because asymptomatic carriage is common.

Disinfection
Clean and disinfect surfaces and materials soiled with respiratory secretions.

Health education
Key messages include being aware of signs and symptoms, and the importance of early medical advice and treatment.

Ensure people are aware of the availability of and recommendations for meningococcal vaccines.

General recommendations for meningococcal vaccination are for:
- people who have had or are having a splenectomy (an operation to partly or completely remove the spleen)
- children with functional asplenia (when the spleen does not work properly).

It is also recommended, but not funded, for:
- young people moving to hostels, especially in their first year
- people with sickle cell anaemia
- people with terminal complement deficiencies
- people with human immunodeficiency virus (HIV)
- military recruits
microbiologists and laboratory workers who could be exposed to meningococcal bacteria

travellers to regions where this disease is common – in particular, people participating in the hajj, and people travelling to sub-Saharan Africa (the so-called 'Meningitis Belt').

See the Immunisation Handbook (Ministry of Health 2011) for more details.

**Reporting**

Ensure complete case information is entered into EpiSurv.

If a cluster of cases occurs, inform the Ministry of Health Communicable Diseases Team and outbreak liaison staff at ESR, and complete the Outbreak Report Form.

**References and further information**


