The Management and Prevention of Meningococcal Disease Policy of the Canberra Hospital

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Adapted from draft guidelines by The Meningococcal Disease Working Party of the National Health and Medical Research Council

Epidemiology

In Australia, the incidence of meningococcal disease has been increasing over the last decade. The majority of cases were sporadic, but clusters and outbreaks of disease were also reported, and some were managed with school or community-based vaccination programs.

Meningococcal disease affects mainly children under five years of age and adolescents, and can kill previously healthy children within several hours of onset. With the decline of invasive disease caused by *Haemophilus influenzae* type b (Hib) following the introduction of the conjugate Hib vaccine in 1993, *Neisseria meningitidis* is now the major cause of childhood meningitis in Australia. The disease has a seasonal fluctuation, with the incidence rising in June and peaking around October each year.

Patient Management

Effective management of meningococcal infection requires early intervention with appropriate antibiotics and careful attention to associated manifestations such as shock and coagulopathies. The appearance of a petechial rash in association with fever, vomiting and drowsiness is highly suggestive of meningococcal meningitis and requires early empirical therapy. Not all patients with invasive meningococcal disease however have meningitis. Many may have bacteraemia without meningeal involvement and many others may have either no rash at all or no distinctive rash. Early recognition of meningococcal infection depends most of all on the clinical suspicion of the physician. The diagnosis can be difficult with sporadic cases unless there is high awareness of the problem in the community and among health care providers.

Empirical therapy (before hospital admission)

When meningococcal infection is suspected clinically, immediate empirical therapy in the absence of a formal diagnosis is indicated This is particularly important in patients with haemorrhagic features. **However, to confirm the clinical diagnosis, a blood culture sample should be collected before administering the antibiotic where possible, but it should not delay treatment. The blood culture specimen should accompany the patient to hospital.** Where available, therapy should cover infection with *N. meningitidis* and other invasive pathogens such as *Strep. pneumoniae* and *Haemophilus influenzue type b*. Treatment should be started immediately (before transfer to hospital) and not be withheld until *N. meningitidis* or another organism has been identified.

The treatment of choice to cover the common causes of bacterial meningitis is ceftriaxone (50mg/kg for adults, lOOmg/kilogram for children to a maximum of 4 grams) administered intravenously. Ceftriaxone is not currently available as an Australian emergency (doctor's bag) but should be used where possible. Alternatively cefotaxime (100 mg/kg to a maximum of 2g) administered intravenously may be used. It is however also not currently available as a 'doctor's bag' drug. Benzylpenicillin is available as a doctor's bag drug and should be used where ceftriaxone or cefotaxime is unavailable and when *N meningitidis* is suspected on clinical and/or epidemiological grounds. The empirical dose is 100,000 units or 60 mg/kg to a maximum dose of 6 million units (4 grams).

Ampicillin or amoxycillin (lOOmg/kg intravenously) may be used if benzylpenicillin is not available. Chloramphenicol (25mg/kg) is also an alternative when both penicillin and third generation cephalosporins are contraindicated (eg because of hypersensitivity).

All antibiotics should be given intravenously, unless intravenous access cannot be obtained. Whilst an intravenous cannula is desirable, the dose can be given via a steel needle of a 'butterfly' needle. Intramuscular administration is not appropriate in this setting as supervening shock and hypotension may impair absorption of the injected antibiotics.

Hospital therapy

There should be no delay in the initiation of treatment before or after hospital admission. Initial therapy with ceftriaxone or cefotaxime (either alone or with benzylpenicillin) should be given. Therapy can then be modified depending on culture and sensitivity results. Therapy for meningococcal infection should be contained for at least five days, and for either proven or probable meningitis should be continued for at least 5 days following resolution of fever.

Diagnostic tests

Therapy should not be delayed while awaiting results of diagnostic tests (such as a CT scan). After arrival in hospital all patients with suspected meningococcal infection should have a blood culture collected as soon as possible. A throat swab could also be collected but its value is controversial. In a patient who has received prior antibiotics it may however be the only positive culture site. Blood should be taken for neutrophil and platelet counts. If

petechiae are present or frank bleeding is evident, formal coagulation studies should be undertaken. Additional investigations such as chest xrays, electrolyte and acid-base studies should be performed where the clinical picture warrants.

Diagnosis is confirmed by the isolation of *N. meningitidis*, the demonstration of Gram negative diplococci or the detection of meningococcal antigen in CSF, blood or other normally sterile site. The role of urinary antigen tests, serum antibody tests and PCR in the management of meningococcal disease requires further clarification, but as yet are of doubtful or unproven clinical benefit.

In patients with suspected meningitis, CSF collection by lumbar puncture has been the mainstay of diagnosis. However meningitis may be associated with raised intracranial pressure, cerebral oedema and swelling and possibly with focal swelling or mass lesions such as abscesses. Where evidence exists for raised intracranial pressure (for example clouded or impaired consciousness, papilloedema, focal neurological signs or vomiting) lumbar puncture should be deferred until therapy and supportive measures have been established and investigations such as a CT scan are performed to define any intracranial lesion(s). The patient's coagulation status should be considered prior to lumbar puncture owing to the potential risk of haemorrhage from a concomitant coagulopathy.

Management of Contacts

Close contacts of cases of invasive meningococcal disease and those considered to be at increased risk of developing meningococcal disease are household members, dormitory contacts, staff end children in child-care facilities, and subjects directly exposed to the patient's oral secretions, eg mouth kissing contacts, those sharing food and drinks, and who have performed mouth-to-mouth resuscitation. Health staff who provide clinical care, but do not perform mouth-to-mouth resuscitation or are not involved with intubation, are not at increased risk of disease, nor are classroom and casual contacts of a sporadic case.

Chemoprophylaxis should be given to contacts as soon as possible after diagnosis of the index case. Follow-up of patients and contacts relies on close cooperation between treating clinicians, other involved parties and the local public health authority. Generally the treating clinician is responsible for prescribing chemoprophylaxis for household contacts. Where there are more contacts involved, eg, child care facilities or schools, the public health authority arranges chemoprophylaxis in cooperation with the treating clinician.

The risk of disease among close contacts can be reduced by providing chemoprophylaxis with rifampicin at a dose of 10mg/kg twelve-hourly for two days to children (maximum of 600mg twice daily) and 600mg twelve-hourly for two days to adults. Alternative antibiotics include:

a) single dose ceftriaxone 5mg/kg, to a maximum of 250 mg intramuscularly (reduced to 125mg in children under 15 years of age, and not given to infants below six weeks of age)

or

b) ciprofloxacin 500mg as a single oral dose (not given to children under 12 years of age, to persons less than 40kg bodyweight, or to pregnant women.

Side Effects of Antibiotics

Rifampicin

- Orange discolouration of tears, urine and permanent staining of soft contact lenses.
- Gastrointestinal disturbance, dizziness, drowsiness, headache.
- Interaction with oral contraceptives. Women on oral contraceptives must use another means of contraception during rifampicin therapy and until they have taken 7 consecutive days of hormone contraceptive tablets after cessation of rifampicin.
- Interference with the metabolism of many drugs including: warfarin, chloramphenicol, penobarbitone and phenytoin

Rifampicin is contraindicated in pregnancy, active liver disease and known rifampicin hypersensitivity.

Ceftriaxone

- Hypersensitivity reactions
- Pseudomembranous colitis
- Hypoprothrombinaemia
- Local reactions
- Biliary sludge

Ciprofloxacin

- Pseudomembranous colitis
- CNS stimulation
- Crystalluria
- Gastrointestinal upset
- Rash

*Antihiotics **do not** guarantee 100% protection against future infection.*

Notification

Invasive meningococcal disease is notifiable in all Australian states and territories. Clinicians and laboratory staff should notify patients rapidly by phone or fax so that contact tracing and chemoprophylaxis can be instituted promptly.

The NHMRC recommends the following surveillance case definition:

1. Isolation of *Neisseria meningitidis* from a normally sterile site; or
2. Detection of meningococcal antigen in joints, blood or CSF; or
3. Detection of Gram negative intracellular diplococci in blood or CSF.

Formal Guidelines

The Meningococcal Disease Working Party of the NHMRC distributed draft guidelines on the control of the disease in Australia for comment in 1995, and the final version will be available in 1997.