



PAEDIATRIC ACUTE CARE GUIDELINE

Meningitis

Scope (Staff):	All Emergency Department Clinicians
Scope (Area):	Emergency Department

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<http://kidshealthwa.com/about/disclaimer/>

Meningitis

Background

- Since it may be impossible in the Emergency Department to distinguish clinically between viral and bacterial meningitis, all cases of meningitis should initially be managed as if the cause were bacterial

General

- Despite advances in the diagnosis and prevention of meningitis it remains a major cause of morbidity and mortality in children
- Although a significant reduction in case numbers was achieved by the introduction of the vaccines against *Haemophilus influenza* type b and *Streptococcus pneumoniae*, meningitis continues to pose a risk of death or permanent disability to children

The usual cause of meningitis in children differs according to age:

Age	Organism (in order of likelihood)
0 – 1 month	Group B Streptococcus, <i>Escherichia coli</i> , <i>Neisseria meningitidis</i> , <i>Haemophilus influenzae</i> type b (Hib), <i>Streptococcus pneumoniae</i> , <i>Listeria monocytogenes</i>
1 – 3 months	<i>Neisseria meningitidis</i> , <i>Haemophilus influenzae</i> type b (Hib), <i>Streptococcus pneumoniae</i> , Group B Streptococcus, <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>
3 months – 5 years	<i>Neisseria meningitidis</i> , <i>Streptococcus pneumoniae</i> , <i>Haemophilus influenzae</i> type b (Hib) *
6 years and older	<i>Neisseria meningitidis</i> , <i>Streptococcus pneumoniae</i>

	* Rare since the introduction of Hib vaccine
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History

- Obtain a general medical history

Important questions to ask early:

- Immunisation status, ensure immunisations are not “alternative medicine” or “homeopathic”
- Recent antibiotic use – as it could be partially treated meningitis, and recent antibiotic use may also be a risk factor for carriage of relatively resistant Pneumococci requiring addition of Vancomycin to the treatment regimen

Examination

- The child may be obviously unwell, look septic, moribund, floppy and pale with a high pitch cry
- High fever, vomiting, neck stiffness and photophobia may be evident
- The child may have an altered conscious level or focal neurological signs – 20% will have seizures sometime during the course of the illness

Early Presentation:

- Child may have less obvious signs of meningitis
- Fever is common and headache, irritability, anorexia or vomiting may be present

Neonates and Infants:

- May present with non-specific signs of infection such as poor feeding, irritability, lethargy, vomiting or fever without focus.
- The clinician should have a high index of suspicion for the possibility of meningitis, and have a low threshold for performing a diagnostic lumbar puncture

Investigations

Lumbar Puncture (LP)

- LP is the only way to confirm the diagnosis of meningitis
- It allows identification of the organism and its antibiotic sensitivities, thus ensuring appropriate use of antibiotics
- LP should (with few exceptions) be performed in every child who may have meningitis
- A good rule of thumb is that if you are asking yourself “should this child have an LP?” the answer generally is “YES”

Contraindications For LP:

- Coma, decreased conscious state
- Signs of raised intracranial pressure: altered pupillary responses, absent Doll's eyes reflexes, decerebrate or decorticate posturing, papilloedema, Cushing's Triad (abnormal respiratory pattern, hypertension, bradycardia)
- Seizures
- Focal neurological signs
- Coagulopathy (e.g. disseminated intravascular coagulation in Meningococcal disease)
- Shock, cardiovascular compromise
- Respiratory compromise

Not contraindications For LP:

- Brief tonic-clonic, myoclonic, absence or atonic seizures, in isolation
- Drowsiness
- Irritability
- Vomiting

If LP is contraindicated, consider a head CT, and start treatment immediately.

CSF Volumes Required:

- An absolute minimum of 500 microlitres (0.5mL) is required, with 750 micro litres preferred
- One drop of CSF = 30-40 microlitres, thus a minimum of 15-20 drops is needed, collected in three bottles

See ED Guideline: [Lumbar Puncture](#)

Other Tests

Blood Tests:

Blood culture	Where possible, a large volume of blood should be cultured Ideally 5 mL in each of the adult aerobic and anaerobic culture bottles
FBC	EDTA tube (purple/lilac top)
CRP	Lithium heparin tube (green top)
PCR	Meningococcal PCR – requires a second separate EDTA tube (purple/lilac top)
Electrolytes	Especially for sodium, lithium heparin tube (green top)
Capillary / Venous blood gas	Defines overall metabolic status of child
Clotting	Blue top tube filled to and not beyond mark on tube
Group and hold	Pink top tube Requires hand written patient information on the label, not patient sticker

Throat Swab:

- PCR for Meningococcus

Cranial CT:

- This is of limited use in acute bacterial meningitis
- CT does not reliably exclude raised intracranial pressure, and a normal CT should not reassure one about the risk of coning following an LP
- CT does have a role when the diagnosis is in doubt (e.g. posterior fossa tumours can also cause meningism), or when complications of meningitis (e.g. brain abscess) are suspected

Management

- Time to antibiotics is **crucial** – early empirical antibiotics will decrease mortality
- Ideally antibiotics should be given once the septic screen, including the LP is done – but if this is not possible, **do not delay** antibiotic administration

Initial management

Antibiotics:

- < 1 mth of age: IV **Cefotaxime** (50mg/kg) and IV **Benzylpenicillin** (50mg/kg) and IV **Aciclovir** – see [King Edward Memorial Hospital Neonatal Clinical Care Unit – Drug](#)

[Protocols](#)

- ≥ 1 mth of age: IV **Ceftriaxone** (50mg/kg, max dose 2g) and IV **Vancomycin** (15mg/kg, max dose 750mg) – see ED [Antibiotics Guideline](#)
- In all children $>1/12$ consider adding IV **Aciclovir** for suspected Herpes simplex encephalitis – see ED [Antibiotics Guideline](#)

Steroids:

- The role of steroids in the treatment of meningitis has been controversial
- A recent Cochrane review states that steroids may reduce neurological sequelae (particularly hearing loss) in meningitis
- Current management at PMH is to give IV Dexamethasone 0.2 mg/kg 6 hourly
- Where possible, give the first dose just prior to or at least concurrently with antibiotics
- However antibiotics should never be delayed when Dexamethasone is not immediately available

Fluids:

- Patients with meningitis are at risk of hyponatremia secondary to syndrome of inappropriate antidiuretic hormone hypersecretion (SIADH)
- Therefore any maintenance or replacement fluid should be isotonic (0.9% saline), with or without glucose (5%)
- Fluid rate should be at 30-70% maintenance, see ED Guideline [Fluids – Intravenous Therapy](#)
- Careful management of fluids and electrolytes is essential in the treatment of meningitis
- Underhydration, overhydration, and rapid shifts in cerebral fluid balance are all associated with an adverse neurological outcome
- Maintaining a normal blood pressure and circulating volume is essential to maintain optimal cerebral perfusion
- If the child is hypotensive, this should be treated with a bolus of 20 mL/kg of 0.9% saline. If the child remains shocked, a further bolus of 10 mL/kg of 0.9% saline should be given, and advice should be sought from PICU
- If the child was not initially hypotensive a more cautious approach is needed to avoid precipitating / exacerbating cerebral oedema, and boluses of IV fluid should be avoided


Admission criteria

- All children with suspected meningitis will be admitted under the General Paediatric Team

References

- Cochrane Summary: [Corticosteroids for Bacterial Meningitis](#)

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