Management of Bacterial Meningitis in Children and Young People

Incorporates NICE Bacterial Meningitis and Meningococcal Septicaemia Guideline CG102. Distributed in partnership with NICE

Symptoms and signs of bacterial meningitis?
- Check airway, breathing and circulation; gain vascular access
- Signs of raised intracranial pressure (RIOP) or shock?
- Perform diagnostic tests
- Correct any dehydration

Empiric antibiotics for suspected menigitis
- IV Cefotaxime or Ceftriaxone
- Either Amoxicillin or Ampicillin

Contraindication to Lumbar Puncture?
- <3 months old?

Perform Lumbar Puncture
- Do not await CSF results before starting antibiotics

Empiric antibiotics for suspected meningitis
- IV Ceftriaxone unless contraindicated

Start Adrenaline infusion (central) if continuing need for Volume resuscitation & Inotropes

Do not perform Lumbar Puncture; Nil by mouth if bleeding or performing invasive procedure (i.e. central line insertion) treat coagulopathy

Antibiotics for confirmed meningitis
- Meningococcus: IV Ceftriaxone for 7 days
- IV in flavivirus: IV Ceftriaxone for 10 days
- S pneumoniae: IV Ceftriaxone for 14 days, add Vancomycin if resistant
- Group B Strep: IV Cefotaxime for ≤14 days
- L monocytogenes: Amoxicillin or Ampicillin for 21 days in total, plus IV Gentamicin for at least the first 7 days
- Gram-negative bacilli: IV Cefotaxime for ≤21 days (unless alternative directed by local antimicrobial resistance patterns or specific sensitivities)

Close monitoring for signs of Raised ICP, Shock & repeat review

Go to Meningococcal Disease Algorithm if signs are found and consult a paediatric intensivist, anaesthetist, or intensivist

Perform delayed LP if no longer contraindicated

If LP contraindicated, perform delayed LP when no longer contraindications.

Specific pathogen identified?

Antibiotics for unconfirmed meningitis

IV Cefotaxime (or Ceftriaxone unless contraindicated) + either Amoxicillin or Ampicillin IV for a 14 days.

<3 months old?

IV Cefotaxime for ≥10 days.

Notify public health, prophylaxis seen

on Meningococcal disease algorithm; Long-term management

Recommendations for Lumbar Puncture
- Clinical or radiological signs of raised intracranial pressure
- Shock
- After convulsions until stabilised
- Convolution abnormalises:
  - Clotting studies (if obtained) outside the normal range
  - Platelet count below 100 x 10^9/L
  - Anaesthetic therapy
  - Local superficial infection at LP site
- Respiratory insufficiency
- Perform delayed LP in children with suspected bacterial meningitis when contraindications no longer present

Contraindications to Ceftriaxone
- Premature neonates with corrected gestational age ≤41 weeks and other neonates ≤1 month old, particularly those with jaundice, hypoplasia, hypoaalbumineraemia, or acidosis; or receiving concurrent treatment with intravenous calcim.

Indications for CT scan in children with suspected bacterial meningitis
- CT scan cannot reliably detect raised intracranial pressure. This should be assessed clinically.
- Perform a CT scan to detect other intracranial pathologies if GCS ≤8 or focal neurological signs in the absence of an explanation for the clinical features.

Do not delay treatment to undertake a CT scan.
- Clinically stabilise the child before CT scanning.
- Consult a paediatric intensivist, anaesthetist, or intensivist.

Indications for tracheal intubation and mechanical ventilation
- Threatened or actual loss of airway patency (e.g. GCS ≤8, response to pain only)
- Need for any form of assisted ventilation e.g. bag-mask ventilation.
- Clinical observation of increased work of breathing
- Hypoventilation or Apnoea
- Features of respiratory failure, including:
  - Irregular respiration (e.g. Cheyne-Stokes breathing)
  - Hypoxia (saturation ≤94% in air, PaO2 < 13 kPa or 97.5mmHg).
  - Hypoventilation or Apnoea.

Insert 2 large IV cannulae (or intraosseous); Take bloods, see Meningococcal algorithm. Take Throat swab. If limited blood volume, vigorously ventilate

Urgently call consultant in Emergency Medicine, Paediatrics, Anaesthesia or Intensive Care

Give 0.2 ml/kg of 50% MgSO4 over 30 mins IV (max 10 ml).

Start Peripheral inotropes (Dopamine); if IO access start Adrenaline determine need for inotropes. Guide by lactate, tachycardia, perfusion, hepatomegaly to avoid fluid overload and resuscitation –

If shock persists immediately give second bolus of 20 ml/kg of 0.9% Saline or of 4.5% dextrose and run at 10 ml/hr = 10 mcg/kg/min. (These dilute solutions can be added to Noradrenaline)

Suxamethonium 2 mg/kg (caution, high potassium). ETT size = age/4 + Weight (kg) = 2 x (age in years + 4)

Start High-dose inotropes (Dopamine 20 mcg/kg/min or higher) if inotropes needed

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www.meningitis.org

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8th Edition

Normal systolic blood pressure = 80 + (age in years x 2)
N.B. Low BP is a pre-terminal sign in children

Call consultant in Emergency Medicine, Paediatrics, Anesthesis or Intensive Care
Initial assessment looking for shock/raised ICP
Do not perform Lumbar Puncture yet
Give IV Ceftriaxone (30 mg/kg od) without delay
Do not use Ceftriaxone at the same time as calcium-containing solutions:
In this situation use Cefotaxime (50 mg/kg od)

Do not perform Lumbar Puncture yet

Anticipate, monitor and correct:

Hypocalcaemia

Hypokalaemia

Acidosis

Hypoglycaemia

Consider Urinary catheter to monitor output

Giving 0.1 ml/kg 10% CaCl2 (0.7 mmol/ml) over 30 mins IV (max 10 ml) or

Central line preferable. Caution if anuric.

Give half correction bicarb IV.

Consider Paraldehyde (0.4 ml/kg PR)

IV Lorazepam (0.1 mg/kg) or Midazolam (0.1 mg/kg) bolus

(see bacterial meningitis algorithm for antibiotics against other pathogens)

Notify public health, prophylaxis see

MD7

MD8

MD6

MD5

MD4

MD3

STILL SIGNS OF SHOCK?

YES

NO

DO NOT DELAY ANTIBIOTICS

Transfer to Intensive Care by Paediatric Intensive Care Retrieval Team

Notify public health, prophylaxis see

Long-term management: see on Bacterial Meningitis Algorithm