Management of Bacterial Meningitis in Children and Young People

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

YES T

NO 1

Symptoms and signs of bacterial meningitis?

Check airway, breathing and circulation; gain vascular access

Signs of raised intracranial pressure (RICP) or shock?



Edition 2A

Perform Lumbar Puncture

Do not await CSF results before starting antibiotics

YES

Empiric antibiotics for suspected meningitis

Perform CT Scan

IV Ceftriaxone for

≥10 days.

Antibiotics for unconfirmed meningitis

IV Ceftriaxone unless contraindicated BM3

DO NOT DELAY ANTIBIOTICS



Endorsed by



Perform diagnostic tests **BM1** Correct any dehydration

Add Vancomycin if recently overseas, or prolonged or multiple antibiotic exposure within last 3 months.

LP results available?

YES \

Contraindication to Lumbar Puncture? BM2 YES, <3 months old?

IV Cefotaxime + either Amoxicillin or Ampicillin (can replace Cefotaxime with Ceftriaxone if no

YES

contraindication **BM3**) DO NOT DELAY ANTIBIOTICS

Empiric antibiotics for suspected meningitis

Meningococcal **Disease Algorithm**

www.meningitis.org

NICE Fever in under

5s guideline CG160

www.nice.org.uk/

guidance/cg160

Lumbar puncture suggests meningitis?

In neonates (<28 days old), ≥ 20 cells/µl</p>
In older children > 5 cells/µl or > 1 neutrophil/µl

YES

(if lower cell count, still consider bacterial meningitis if other symptoms and signs suggest the diagnosis especially in neonates).

YES , ■ Consider TB meningitis If raised CSF WCC and risk factors for TB. If TB meningitis in differential diagnosis

YES

Notify public health, prophylaxis see

refer to NICE TB NG33 for appropriate antibiotic treatment Consider Herpes simplex meningoencephalitis. If HSV in differential diagnosis give Aciclovir.

Steroids: Dexamethasone 0.15 mg/kg to a max dose of 10 mg, qds x 4 days for children ≥ 3 months old IF ≤ 12h from first antibiotics and LP shows: ■ frankly purulent CSF ■ CSF WCC > 1000/µl ■ raised CSF WCC and protein > 1 g/L ■ bacteria on Gram stain.

Steroids should not be used in developing countries. If TB meningitis in the differential diagnosis, refer to NICE NG33 before administering steroids.

> NO · ■ Full-volume maintenance fluids: enteral feeds if tolerated or isotonic IV fluids e.g. 0.9% Saline or 0.9% Saline with 5% Glucose ■ Do not restrict fluids unless there is evidence of increased anti-diuretic hormone secretion or RICP

Reduced or fluctuating conscious level or focal neurological signs? BM4

■ Monitor fluid administration, urine output, electrolytes and blood glucose

See Meningococcal Disease Algorithm to treat seizures.

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

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

NO

NO

■ Perform delayed LP if no longer contraindicated BM2

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

Specific pathogen identified?

the first 7 days Gram-negative bacilli: IV Cefotaxime for ≥ 21 days (unless alternative directed by local antimicrobial resistance patterns or specific

Antibiotics for confirmed meningitis

Vancomycin if resistant strain.

Meningococcus: IV Ceftriaxone for 7 days

S pneumoniae: IV Ceftriaxone for 14 days, add

■ *L monocytogenes*: IV Amoxicillin or Ampicillin for

21 days in total, plus IV Gentamicin for at least

■ Group B Strep: IV Cefotaxime for ≥ 14 days

■ *H influenzae*: IV Ceftriaxone for 10 days

sensitivities) Unless directed otherwise by antibiotic sensitivities.

Duration may be dictated by clinical response – discuss with infectious disease specialist.

<3 months old? IV Cefotaxime (or Ceftriaxone unless contraindicated BM3) + either Amoxicillin or Ampicillin IV for ≥ 14 days.

on Meningococcal disease algorithm; Long-term management

NO

BM1 Diagnostic and other laboratory tests:

Take bloods for Blood gas (bicarb, base deficit), Lactate, Glucose, FBC, U&E, Ca++, Mg++, PO₄, Clotting, CRP, Blood cultures, Whole blood (EDTA) for PCR, X-match. Take Throat swab. If limited blood volume, prioritise blood gas, lactate, glucose, electrolytes, FBC, clotting.

BM2 Contraindications to Lumbar Puncture

- Clinical or radiological signs of raised intracranial pressure
- Shock After convulsions until stabilised
- Coagulation abnormalities
- Clotting study results (if obtained) outside the normal range
- Platelet count below 100 x 10⁹/L
- on Anticoagulant therapy
- Local superficial infection at LP site
- Respiratory insufficiency.

Perform delayed LP in children with suspected bacterial meningitis when contraindications no longer present

BM3 Contraindications to Ceftriaxone

Premature neonates with corrected gestational age < 41 weeks and other neonates <1 month old, particularly those with jaundice, hypoalbuminaemia, or acidosis; or receiving concomitant treatment with intravenous calcium.

BM4 Indications for CT scan in children with suspected bacterial

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

Do not delay treatment to undertake a CT scan.

Clinically stabilise the child before CT scanning.

Consult a paediatric intensivist, anaesthetist, or intensivist.

BM5 Indications for tracheal intubation and mechanical ventilation Threatened or actual loss of airway patency (e.g. GCS <9, 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), hypercapnoea (PaCO₂ > 6 kPa or 45 mmHg)
- Continuing shock following 40ml/kg of resuscitation fluid
- Signs of raised intracranial pressure
- Impaired mental status
- GCS drop of ≥ 3, or score <9, or fluctuation in conscious level - Moribund state
- Control of intractable seizures
- Need for Stabilisation for brain imaging or for transfer to PICU.

Should be undertaken by a health professional with expertise in paediatric airway management, Consult PICU. (See MD4)

BM6 Repeat LP in neonates after starting treatment if:

persistent or re-emergent fever, new clinical findings (especially neurological findings), deteriorating clinical condition, or persistently abnormal inflammatory markers

BM7 Long-term management: Before discharge consider need for after care, discuss potential long-term effects with parents, arrange hearing test. Refer children with severe or profound deafness for cochlear implant assessment ASAP. Use MRF discharge checklist http://www.meningitis.org/assets/x/55764. Provide 'Your Guide' and direct to meningitis support organisations www.meningitis.org/recovery or www.meningitisnow.org/recovery. Offer further care on discharge as needed. Paediatrician to review child with results of their hearing test 4-6 weeks after discharge from hospital considering all potential morbidities and offer referral. Inform GP, health visitor or school nurse.

Based on NICE CG102 www.nice.org.uk/guidance/CG102

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