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 (RICP) or shock?

Perform diagnostic tests **BM1**

Correct any dehydration

Contraindication to Lumbar Puncture? BM2

<3 months old?

Add Vancomycin if recently overseas, or prolonged or multiple

Consider TB meningitis If raised CSF WBC count and risk factors

for TB. If TB meningitis in differential diagnosis refer to NICE TB

Consider Herpes simplex meningoencephalitis. If HSV in

antibiotic exposure within last 3 months,

CG33 for appropriate antibiotic treatment.

differential diagnosis give Aciclovir.

YES

YES

NO **1**

YES \



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NO

RCP®H Paediatrics and Child Health

Leading the way in Children's Health

NICE feverish illness guideline CG47 www.nice.org.uk/cg047

Perform Lumbar Puncture

YES

YES

NO

Lumbar puncture suggests meningitis?

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

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

Empiric antibiotics for suspected meningitis v Ceftriaxone unless contraindicated BM3

DO NOT DELAY ANTIBIOTICS

Steroids: Dexamethasone 0.15mg/kg to a max dose of 10mg, qds x 4 days

if ≤ 12h from first antibiotics and LP shows:

- frankly purulent CSF

- CSF WBC count > 1000/µl raised CSF WBC count and protein > 1 g/L

Perform CT Scan

- bacteria on Gram stain

Steroids should not be used in developing countries

If TB meningitis in the differential diagnosis, refer to NICE CG33 before

administering steroids

Reduced or fluctuating conscious level or focal neurological signs? NO T

Full-volume maintenance fluids: enteral feeds if tolerated or isotonic i.v. fluids e.g. 0.9% Sodium Chloride or 0.9% Sodium Chloride with 5% Glucose

Do not restrict fluids unless there is evidence of increased

anti-diuretic hormone secretion or RICP Monitor fluid administration, urine output, electrolytes and blood

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.

Specific pathogen identified?

■ Perform LP if no contraindication BM2.

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

L monocytogenes: i.v. Amoxicillin or Ampicillin for 21 days in total, plus i.v. Gentamicin for at least

Gram-negative bacilli: i.v. Cefotaxime for ≥ 21

Antibiotics for confirmed meningitis

the first 7 days

Meningococcus: i.v. Ceftriaxone for 7 days

■ H influenzae: i.v. Ceftriaxone for 10 days

S pneumoniae: i.v. Ceftriaxone for 14 days

■ Group B Strep: i.v. Cefotaxime for ≥14 days

Empiric antibiotics for suspected meningitis

i.v. Cefotaxime + either Amoxicillin or Ampicillin

(can replace Cefotaxime with Ceftriaxone if no

Meningococcal

Disease Algorithm

www.meningitis.org

contraindication **BM3**)

DO NOT DELAY ANTIBIOTICS

YES

Unless directed otherwise by antibiotic sensitivities. Duration may be dictated by clinical response – discuss with infectious disease specialist.

Antibiotics for unconfirmed meningitis

<3 months old?

i.v. Cefotaxime (or Ceftriaxone unless **YES** Ceftriaxone for contraindicated BM3) + either Amoxicillin ≥10 days or Ampicillin i.v. for ≥14 days

on Meningococcal disease algorithm; Long-term management

NO

BM1 Diagnostic and other laboratory tests:

■ full blood count

coagulation screen

■ whole-blood (EDTA specimen) for PCR

■ CRP

■ blood culture

blood glucose

blood gas

■ LP if no contraindication

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

All ages:

■ Simultaneous administration of calcium-containing infusions but can be given sequentially as long as infusion line flushed between infusions or a different infusion line is used.

Children younger than 3 months:

Prematurity

Jaundice

Acidosis

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 an anaesthetist, paediatrician or intensivist.

BM5 Indications for tracheal intubation and mechanical ventilation

Threatened or actual loss of airway patency (e.g. GCS < 8, response to

■ 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 (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 < 8, 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. Offer further care on discharge as needed. Provide info on support organisations. 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 about illness.

Based on NICE CG102 http://quidance.nice.org.uk/CG102/Guidance

http://guidance.nice.org.uk/CG102/QuickRefGuide/pdf/English

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YES