NHS
National Institute for Health and Clinical Excellence

Quick reference guide (amended)

Issue date: June 2010, with amendments September 2010

Bacterial meningitis and meningococcal septicaemia

Management of bacterial meningitis and meningococcal septicaemia in children and young people younger than 16 years in primary and secondary care

Amendment to recommendation 1.4.45
An important change has been made to recommendation 1.4.45 of the NICE guideline. The recommendation at publication contained an incorrect dose of hydrocortisone. This has been corrected in this version of the quick reference guide – see page 24.

NICE clinical guideline 102
Developed by the National Collaborating Centre for Women's and Children's Health

About this booklet

This is a quick reference guide that summarises the recommendations NICE has made to the NHS in 'Bacterial meningitis and meningococcal septicaemia: management of bacterial meningitis and meningococcal septicaemia in children and young people younger than 16 years in primary and secondary care' (NICE clinical guideline 102).

Who should read this booklet?

This quick reference guide is for healthcare professionals and other staff who care for people who have or who are suspected of having bacterial meningitis or meningococcal septicaemia.

Who wrote the guideline?

The guideline was developed by the National Collaborating Centre for Women's and Children's Health, which is linked with the Royal College of Obstetricians and Gynaecologists. The Collaborating Centre worked with a group of healthcare professionals (including consultants, GPs and nurses), patient members and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

For more information on how NICE clinical guidelines are developed, go to **www.nice.org.uk**

Where can I get more information about the guideline?

The NICE website has the recommendations in full, reviews of the evidence they are based on, a summary of the guideline for patients and carers, and tools to support implementation (see inside back cover for more details).

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NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

This guidance represents the view of NICE, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summary of product characteristics of any drugs they are considering.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Contents

Key to terms used

CRP C-reactive protein

CSF Cerebrospinal fluid

CT Computed tomography

EDTA Ethylenediaminetetraacetic acid

H influenzae *Haemophilus influenzae*

L monocytogenes *Listeria monocytogenes*

N meningitidis *Neisseria meningitidis*

PCR Polymerase chain reaction

SPC Summary of product characteristics

S pneumoniae *Streptococcus pneumoniae*

WBC White blood cell

Introduction

- Meningococcal disease is the leading infectious cause of death in early childhood. It most commonly presents as bacterial meningitis (15% of cases of *N meningitidis*) or septicaemia (25% of cases), or as a combination of the two presentations (60% of cases).
- The epidemiology of bacterial meningitis in the UK has changed dramatically in the past two decades following the introduction of vaccines to control *H influenzae* type b, serogroup C meningococcus and pneumococcal disease. However, no vaccine is currently licensed against serogroup B meningococcus, and this pathogen is now the most common cause of bacterial meningitis (and septicaemia) in children and young people aged 3 months or older.
- The control of meningococcal disease is therefore a priority for clinical management (as well as public health surveillance and control).
- Bacterial meningitis and meningococcal septicaemia are managed in different ways, therefore it is important that healthcare professionals are able to recognise them and manage them accordingly.

Patient-centred care

Bacterial meningitis and meningococcal septicaemia are life-threatening conditions that require urgent medical treatment. Nevertheless, treatment and care should take into account the child's or young person's individual needs and preferences, as well as those of their parents or carers, where possible. In an emergency, if the person with parental responsibility cannot be contacted, healthcare professionals may give treatment immediately when it is in the child's or young person's best interests.

Good communication between healthcare professionals and children and young people, and their parents and carers, is essential. It should be supported by evidence-based information to allow children and young people, and their parents and carers, to reach informed decisions about their care. Follow advice on seeking consent from the Department of Health or Welsh Assembly Government if needed. If the patient agrees, families and carers should have the opportunity to be involved in decisions about treatment and care.

Key priorities for implementation

Symptoms and signs of bacterial meningitis and meningococcal septicaemia

- Consider bacterial meningitis and meningococcal septicaemia in children and young people who present with the symptoms and signs in table 1.
  - Be aware that:
    - some children and young people will present with mostly non-specific symptoms or signs and the conditions may be difficult to distinguish from other less important (viral) infections presenting in this way
    - children and young people with the more specific symptoms and signs are more likely to have bacterial meningitis or meningococcal septicaemia and the symptoms and signs may become more severe and more specific over time.
  - Recognise shock (see table 1) and manage urgently in secondary care.
- Healthcare professionals should be trained in the recognition and management of meningococcal disease.

Management in the pre-hospital setting

- Primary care healthcare professionals should transfer children and young people with suspected bacterial meningitis or suspected meningococcal septicaemia to secondary care as an emergency by telephoning 999.

Diagnosis in secondary care

Investigation and management in children and young people with petechial rash

- Give intravenous ceftriaxone immediately to children and young people with a petechial rash if any of the following occur at any point during the assessment (these children are at high risk of having meningococcal disease):
  - petechiae start to spread
  - the rash becomes purpuric
  - there are signs of bacterial meningitis (see table 1)
  - there are signs of meningococcal septicaemia (see table 1)
  - the child or young person appears ill to a healthcare professional.

Polymerase chain reaction

- Perform whole blood real-time PCR testing (EDTA sample) for *N meningitidis* to confirm a diagnosis of meningococcal disease.

Lumbar puncture

- In children and young people with suspected meningitis or suspected meningococcal disease, perform a lumbar puncture unless any of the following contraindications are present:
  - signs suggesting raised intracranial pressure
    - reduced or fluctuating level of consciousness (Glasgow Coma Scale score less than 9 or a drop of 3 or more)
    - relative bradycardia and hypertension
    - focal neurological signs
    - abnormal posture or posturing
    - unequal, dilated or poorly responsive pupils
    - papilloedema
    - abnormal 'doll's eye' movements
  - shock (see table 1)
  - extensive or spreading purpura
  - after convulsions until stabilised
  - coagulation abnormalities
    - coagulation results (if obtained) outside the normal range
    - platelet count below 100 x 10^9/litre
    - receiving anticoagulant therapy
  - local superficial infection at the lumbar puncture site
  - respiratory insufficiency (lumbar puncture is considered to have a high risk of precipitating respiratory failure in the presence of respiratory insufficiency).

Management in secondary care

Fluids for bacterial meningitis

- Do not restrict fluids unless there is evidence of:
  - raised intracranial pressure, **or**
  - increased antidiuretic hormone secretion[1].

Intravenous fluid resuscitation in meningococcal septicaemia

- In children and young people with suspected or confirmed meningococcal septicaemia:
  - if there are signs of shock give an immediate fluid bolus of 20 ml/kg sodium chloride 0.9% over 5–10 minutes. Give the fluid intravenously or via an intraosseous route and reassess the child or young person immediately afterwards

[1] See National Patient Safety Agency (2007) Patient safety alert 22: Reducing the risk of hyponatraemia when administering intravenous infusions to children. Available from www.nrls.npsa.nhs.uk

- if the signs of shock persist, immediately give a second bolus of 20 ml/kg of intravenous or intraosseous sodium chloride 0.9% or human albumin 4.5% solution over 5–10 minutes
- if the signs of shock still persist after the first 40 ml/kg:
  - immediately give a third bolus of 20 ml/kg of intravenous or intraosseous sodium chloride 0.9% or human albumin 4.5% solution over 5–10 minutes
  - call for anaesthetic assistance for urgent tracheal intubation and mechanical ventilation
  - start treatment with vasoactive drugs
  - be aware that some children and young people may require large volumes of fluid over a short period of time to restore their circulating volume
  - consider giving further fluid boluses at 20 ml/kg of intravenous or intraosseous sodium chloride 0.9% or human albumin 4.5% solution over 5–10 minutes based on clinical signs and appropriate laboratory investigations including urea and electrolytes
- discuss further management with a paediatric intensivist.

Long-term management

Long-term effects of bacterial meningitis and meningococcal septicaemia

- Offer children and young people with a severe or profound deafness an urgent assessment for cochlear implants as soon as they are fit to undergo testing (further guidance on the use of cochlear implants for severe to profound deafness can be found in 'Cochlear implants for children and adults with severe to profound deafness' [NICE technology appraisal 166]).
- Children and young people should be reviewed by a paediatrician with the results of their hearing test 4–6 weeks after discharge from hospital to discuss morbidities associated with their condition and offered referral to the appropriate services. The following morbidities should be specifically considered:
  - hearing loss (with the child or young person having undergone an urgent assessment for cochlear implants as soon as they are fit)
  - orthopaedic complications (damage to bones and joints)
  - skin complications (including scarring from necrosis)
  - psychosocial problems
  - neurological and developmental problems
  - renal failure.

Symptoms and signs of bacterial meningitis and meningococcal septicaemia

Table 1 Symptoms and signs of bacterial meningitis and meningococcal septicaemia

Symptom/sign	Bacterial meningitis (meningococcal meningitis and meningitis caused by other bacteria)	Meningococcal disease (meningococcal meningitis and/or meningococcal septicaemia)	Meningococcal septicaemia	Notes
Common non-specific symptoms/signs				
Fever	✓	✓	✓	Not always present, especially in neonates
Vomiting/nausea	✓	✓	✓	
Lethargy	✓	✓	✓	
Irritable/unsettled	✓	✓	✓	
Ill appearance	✓	✓	✓	
Refusing food/drink	✓	✓	✓	
Headache	✓	✓	✓	
Muscle ache/joint pain	✓	✓	✓	
Respiratory symptoms/ signs or breathing difficulty	✓	✓	✓	
Less common non-specific symptoms/signs				
Chills/shivering	✓	✓	✓	
Diarrhoea, abdominal pain/distension	✓	✓	NK	
Sore throat/coryza or other ear, nose and throat symptoms/signs	✓	✓	NK	
More specific symptoms/signs				
Non-blanching rash	✓	✓	✓	Be aware that a rash may be less visible in darker skin tones – check soles of feet, palms of hands and conjunctivae

✓ symptom/sign present ✗ symptom/sign not present NK: not known if a symptom/sign is present (not reported in the evidence)

Table 1 Symptoms and signs of bacterial meningitis and meningococcal septicaemia (continued)

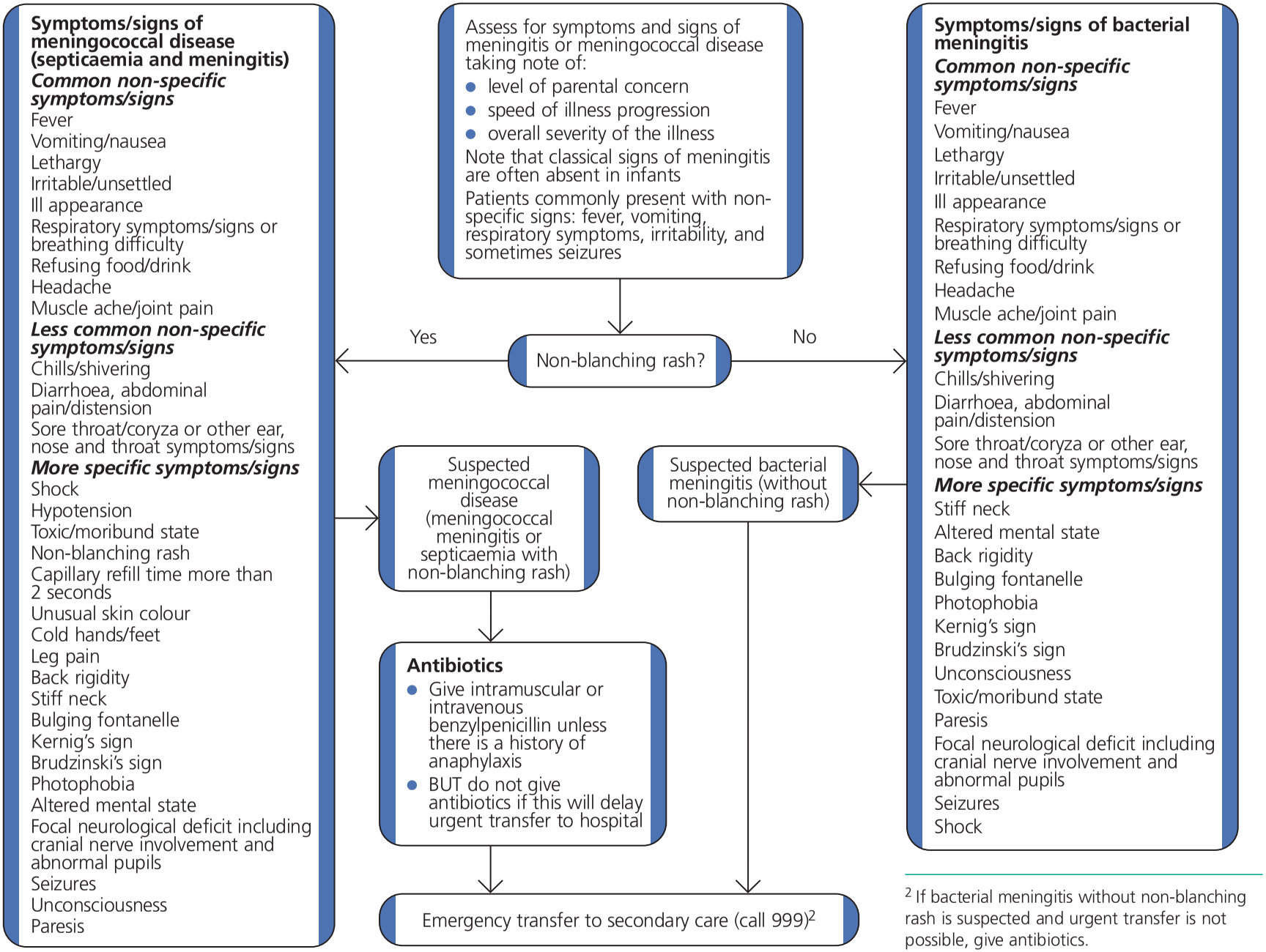
Symptom/sign	Bacterial meningitis (meningococcal meningitis and meningitis caused by other bacteria)	Meningococcal disease (meningococcal meningitis and/or meningococcal septicaemia)	Meningococcal septicaemia	Notes
Stiff neck	✓	✓	NK	
Altered mental state	✓	✓	✓	Includes confusion, delirium and drowsiness, and impaired consciousness
Capillary refill time more than 2 seconds	NK	✓	✓	
Unusual skin colour	NK	✓	✓	
Shock	✓	✓	✓	
Hypotension	NK	✓	✓	
Leg pain	NK	✓	✓	
Cold hands/feet	NK	✓	✓	
Back rigidity	✓	✓	NK	
Bulging fontanelle	✓	✓	NK	Only relevant in children under 2 years
Photophobia	✓	✓	✗	
Kernig's sign	✓	✓	✗	
Brudzinski's sign	✓	✓	✗	
Unconsciousness	✓	✓	✓	
Toxic/moribund state	✓	✓	✓	
Paresis	✓	✓	✗	
Focal neurological deficit including cranial nerve involvement and abnormal pupils	✓	✓	✗	
Seizures	✓	✓	✗	

Signs of shock

- Capillary refill time more than 2 seconds
- Unusual skin colour
- Tachycardia and/or hypotension
- Respiratory symptoms or breathing difficulty
- Leg pain
- Cold hands/feet
- Toxic/moribund state
- Altered mental state/decreased conscious level
- Poor urine output

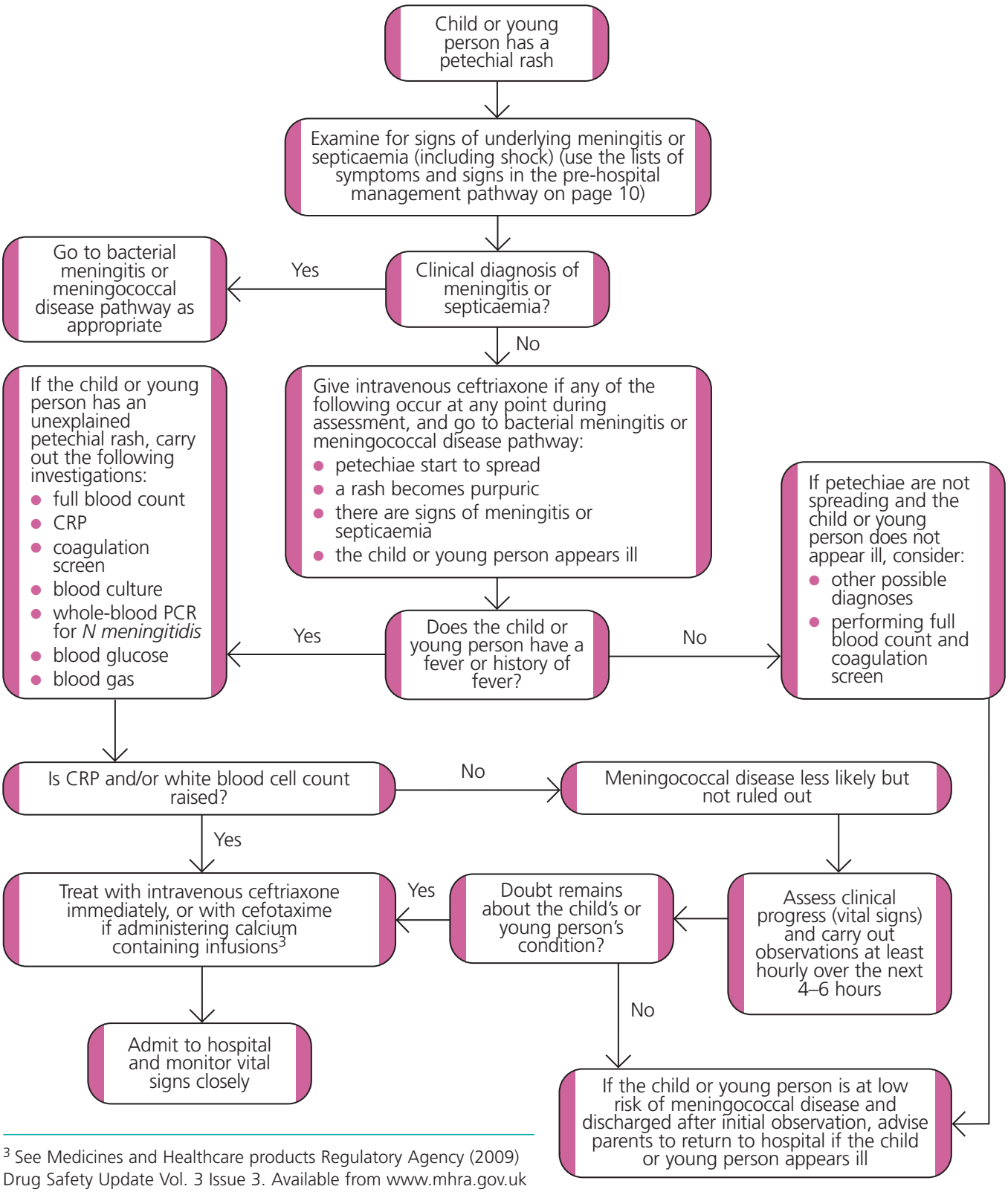
✓ symptom/sign present ✗ symptom/sign not present NK: not known if a symptom/sign is present (not reported in the evidence)

Pre-hospital management – meningococcal disease and bacterial meningitis



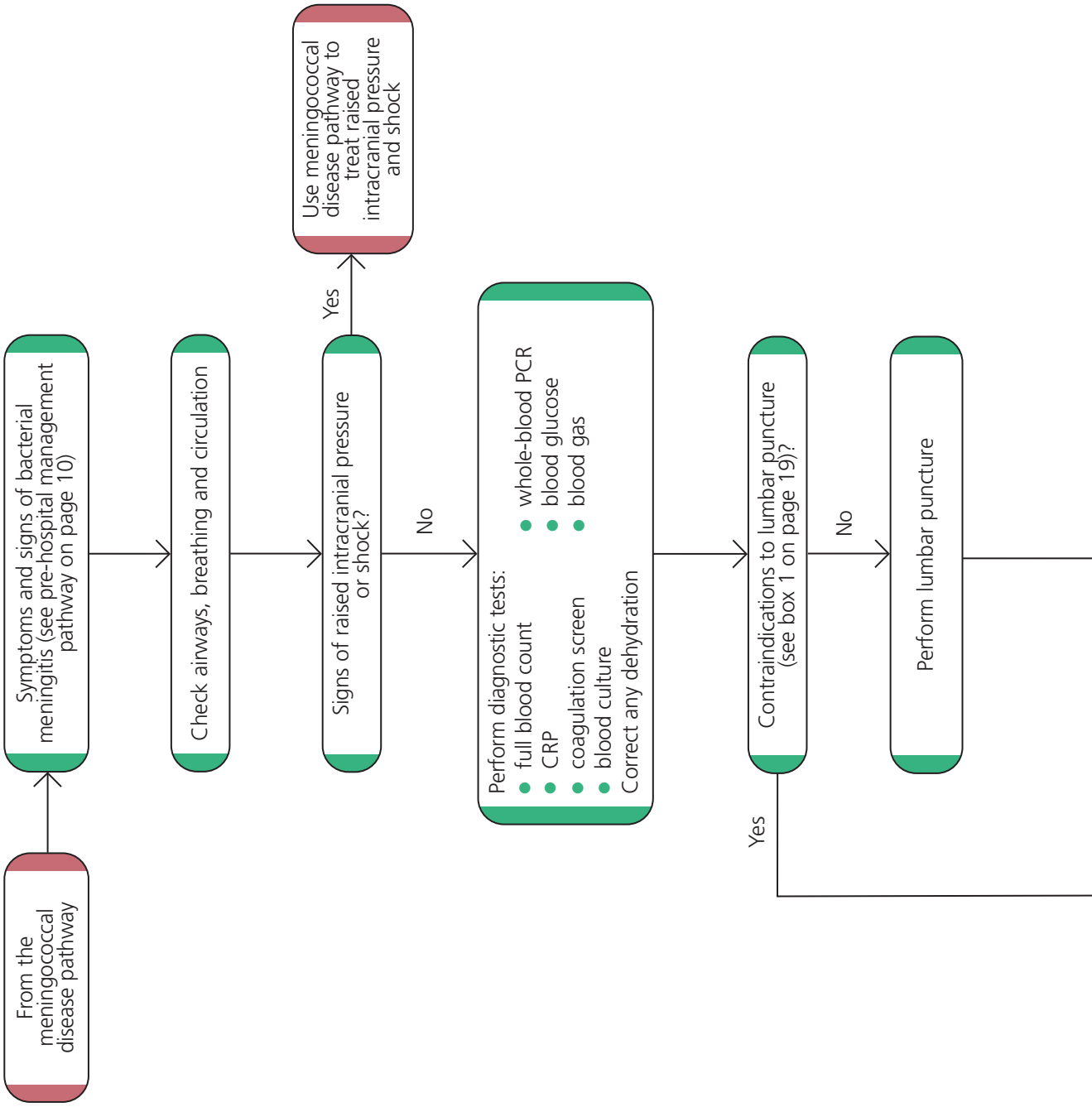
[2] If bacterial meningitis without non-blanching rash is suspected and urgent transfer is not possible, give antibiotics.

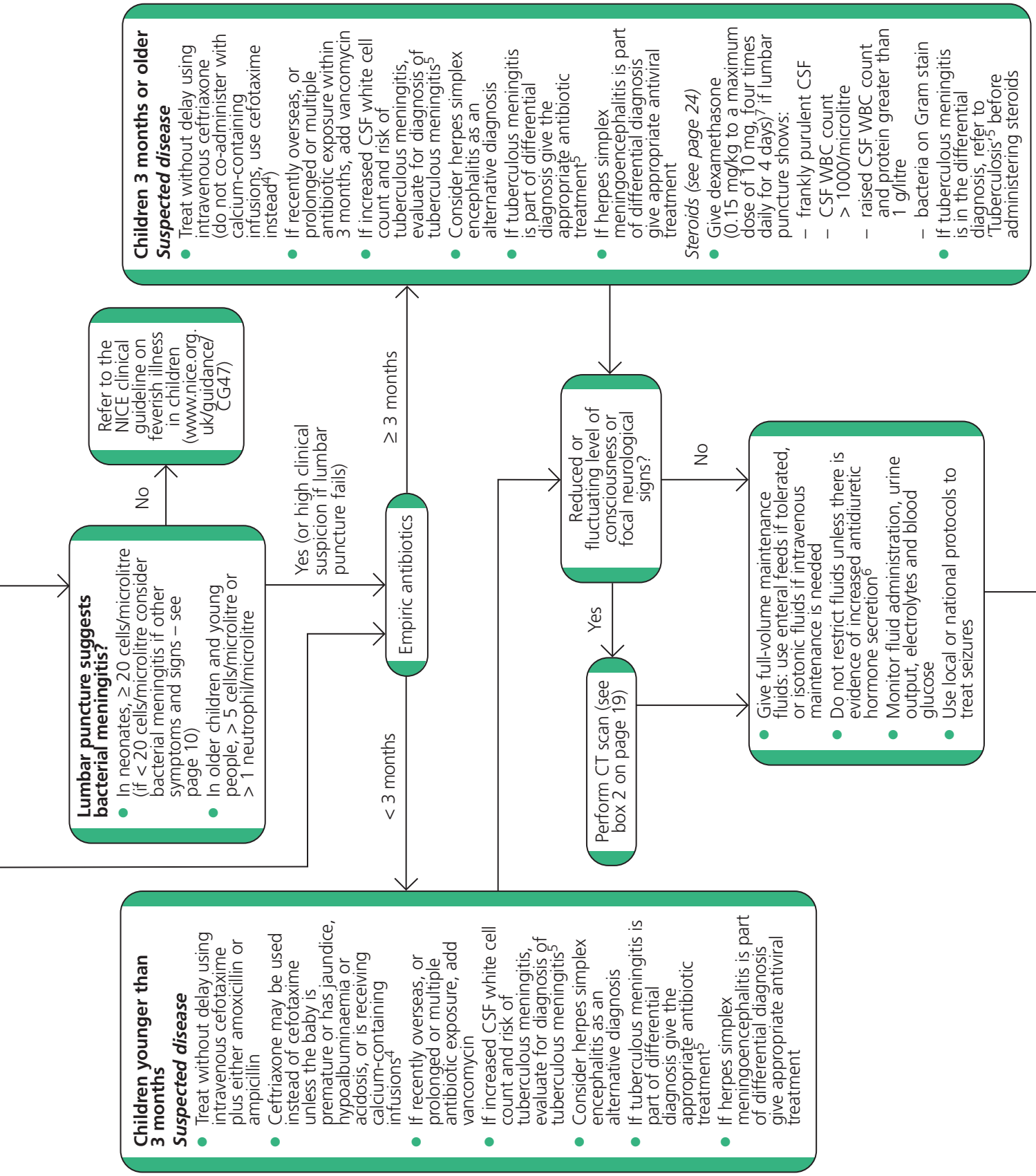
Management of petechial rash

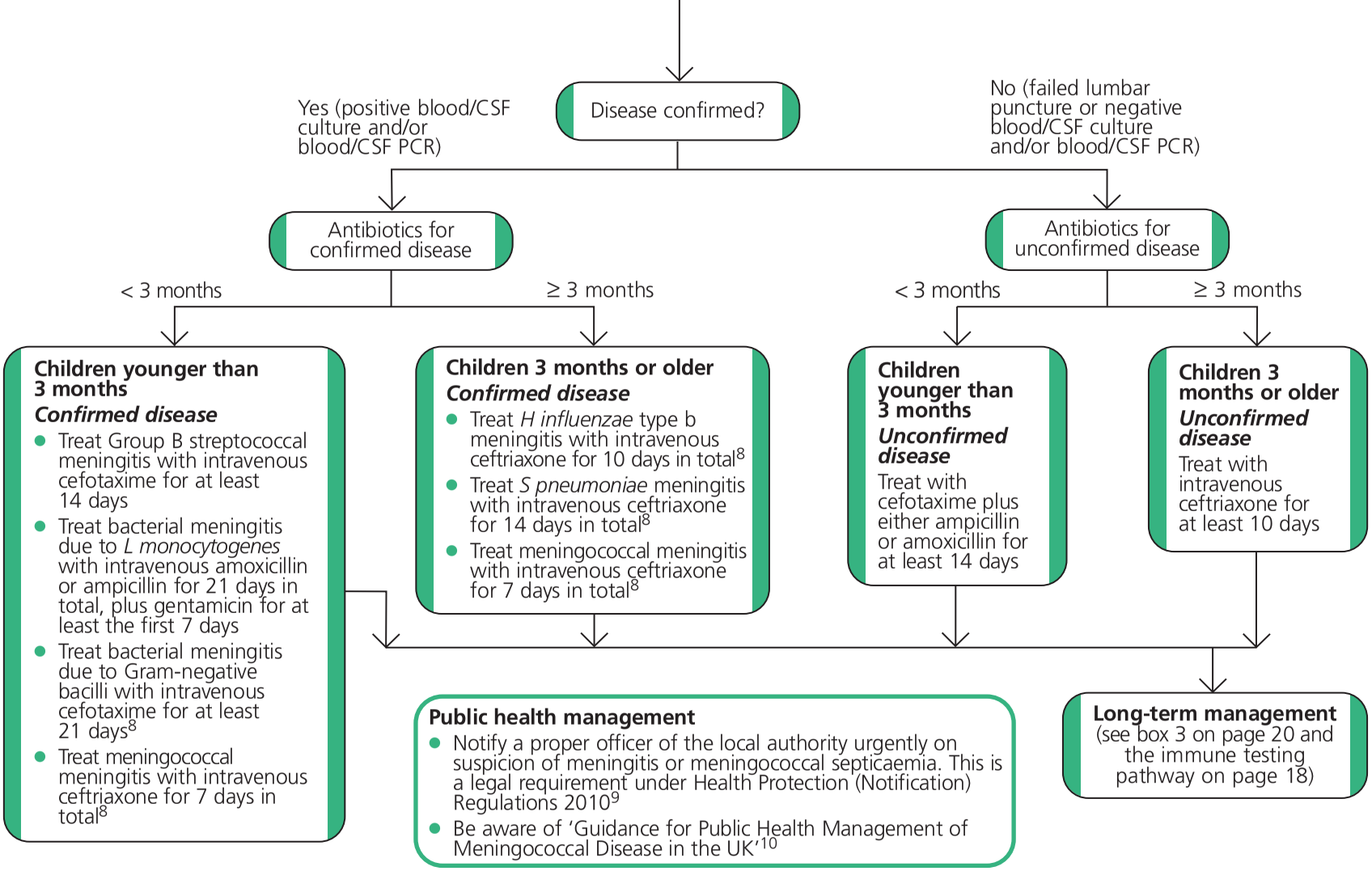


[3] See Medicines and Healthcare products Regulatory Agency (2009) Drug Safety Update Vol. 3 Issue 3. Available from www.mhra.gov.uk

Bacterial meningitis pathway



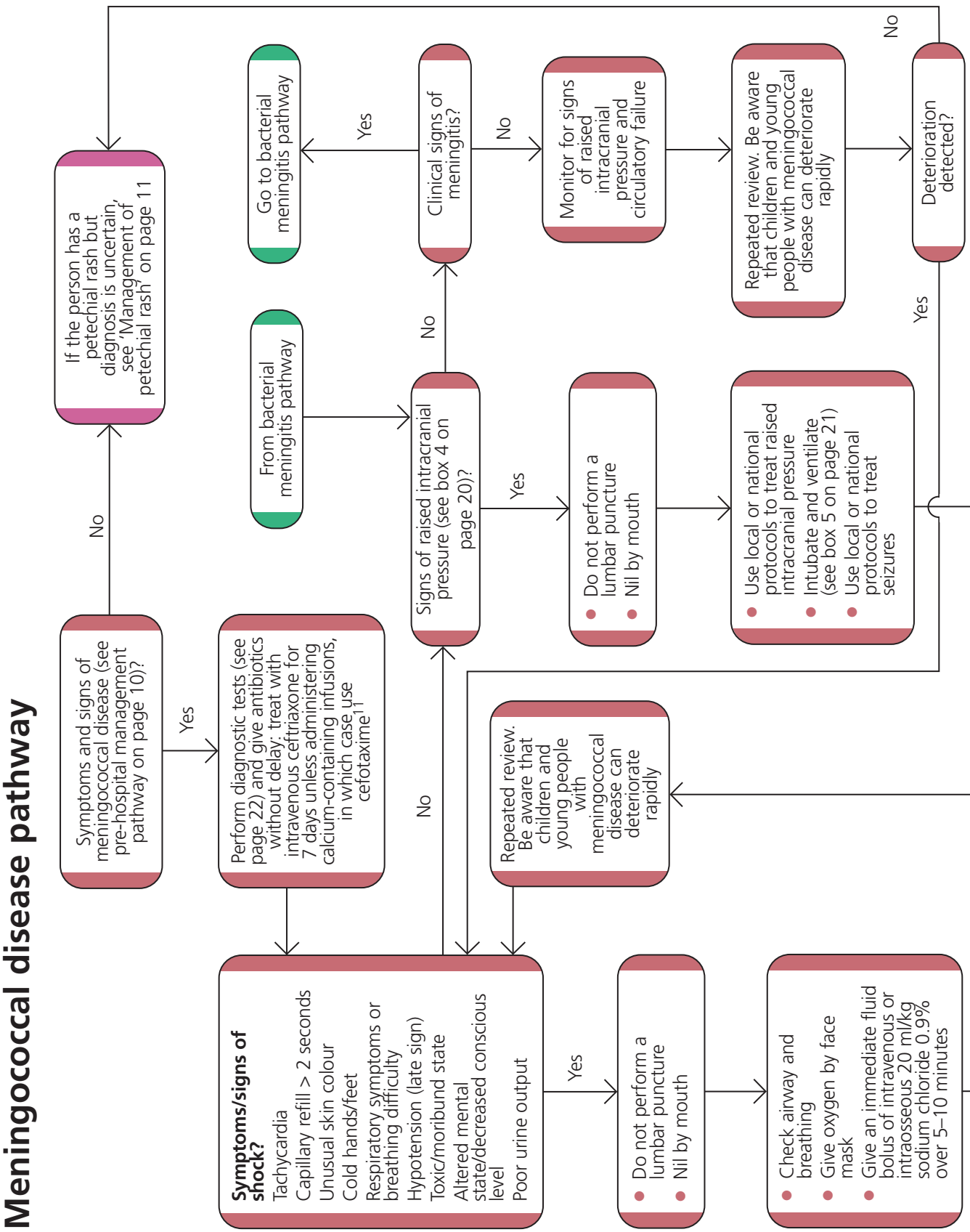

Children 3 months or older
Suspected disease
Treat without delay using intravenous ceftriaxone (do not co-administer with calcium-containing infusions, use cefotaxime instead[4])
If recently overseas, or prolonged or multiple antibiotic exposure within 3 months, add vancomycin
If increased CSF white cell count and risk of tuberculous meningitis, evaluate for diagnosis of tuberculous meningitis[5]
Consider herpes simplex encephalitis as an alternative diagnosis
If tuberculous meningitis is part of differential diagnosis give the appropriate antibiotic treatment[5]
If herpes simplex meningoencephalitis is part of differential diagnosis give appropriate antiviral treatment
Steroids (see page 24)
Give dexamethasone (0.15 mg/kg to a maximum dose of 10 mg, four times daily for 4 days)[7] if lumbar puncture shows:
– frankly purulent CSF
– CSF WBC count > 1000/microlitre
– raised CSF WBC count and protein greater than 1 g/litre
– bacteria on Gram stain
If tuberculous meningitis is in the differential diagnosis, refer to 'Tuberculosis'[5] before administering steroids
Lumbar puncture suggests bacterial meningitis?
In neonates, ≥ 20 cells/microlitre (if < 20 cells/microlitre consider bacterial meningitis if other symptoms and signs – see page 10)
In older children and young people, > 5 cells/microlitre or > 1 neutrophil/microlitre
No
Refer to the NICE clinical guideline on feverish illness in children (www.nice.org.uk/guidance/CG47)
Yes (or high clinical suspicion if lumbar puncture fails)
Empiric antibiotics
≥ 3 months
< 3 months
Reduced or fluctuating level of consciousness or focal neurological signs?
No
Yes
Perform CT scan (see box 2 on page 19)
Give full-volume maintenance fluids: use enteral feeds if tolerated, or isotonic fluids if intravenous maintenance is needed
Do not restrict fluids unless there is evidence of increased antidiuretic hormone secretion[6]
Monitor fluid administration, urine output, electrolytes and blood glucose
Use local or national protocols to treat seizures
Children younger than 3 months
Suspected disease
Treat without delay using intravenous cefotaxime plus either amoxicillin or ampicillin
Ceftriaxone may be used instead of cefotaxime unless the baby is premature or has jaundice, hypoalbuminaemia or acidosis, or is receiving calcium-containing infusions[4]
If recently overseas, or prolonged or multiple antibiotic exposure, add vancomycin
If increased CSF white cell count and risk of tuberculous meningitis, evaluate for diagnosis of tuberculous meningitis[5]
Consider herpes simplex encephalitis as an alternative diagnosis
If tuberculous meningitis is part of differential diagnosis give the appropriate antibiotic treatment[5]
If herpes simplex meningoencephalitis is part of differential diagnosis give appropriate antiviral treatment



[4] See Medicines and Healthcare products Regulatory Agency (2009) Drug Safety Update Vol. 3 Issue 3. Available from www.mhra.gov.uk
[5] See 'Tuberculosis: clinical diagnosis and management of tuberculosis, and measures for its prevention and control'. Available from www.nice.org.uk/guidance/CG33
[6] See National Patient Safety Agency (2007) Patient safety alert 22: Reducing the risk of hyponatraemia when administering intravenous infusions to children. Available from www.nrls.npsa.nhs.uk
[7] The dosage given in the recommendation is based on high-quality evidence and is consistent with established clinical practice (see the full guideline for further details). The guideline will assume that prescribers will use a drug's SPC to inform their decisions for individual patients. Dexamethasone does not have UK marketing authorisation for use at the dose specified in the recommendation. Such use is an off-label use. Informed consent should be obtained and documented in line with normal standards in emergency care.
[8] Unless directed otherwise by the results of antibiotic sensitivities.
[9] www.opsi.gov.uk. The Department of Health has issued guidance on health protection legislation which explains the notification requirements. See 'Health protection legislation guidance 2010' at www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_114510
[10] Health Protection Agency Meningococcus Forum, 2006; see www.hpa.org.uk

Fold out this page to view the bacterial meningitis pathway

Meningococcal disease pathway



Reassess immediately

If signs of shock persist, immediately give a second bolus of intravenous or intraosseous 20 ml/kg sodium chloride 0.9% **or** human albumin 4.5% solution over 5–10 minutes

If signs of shock remain after a total of 40 ml/kg fluid:

- immediately give a third bolus of intravenous or intraosseous 20 ml/kg sodium chloride 0.9% **or** human albumin 4.5% solution over 5–10 minutes
- call for anaesthetic assistance for urgent tracheal intubation and mechanical ventilation (use local or national protocols for intubation)
- start treatment with vasoactive drugs (use local or national protocols)
- consult with paediatric intensivist
- anticipate aspiration and pulmonary oedema

Anticipate, monitor and correct glucose, acid/base and electrolyte disturbances, and anaemia and coagulopathy using local or national protocols

Do not restrict fluids unless there is evidence of:

- raised intracranial pressure, **or**
- increased antidiuretic hormone secretion[12]

- Discuss transfer to intensive care with a paediatric intensivist (see bacterial meningitis pathway for antibiotic treatment of unconfirmed or confirmed disease)
- Transfer to tertiary care should be undertaken by an experienced paediatric intensive care retrieval team

Long-term management
(see box 3 on page 20 and the immune testing pathway on page 18)

Public health management

- Notify a proper officer of the local authority urgently on suspicion of meningitis or meningococcal septicaemia. This is a legal requirement under Health Protection (Notification) Regulations 2010[13]
- Be aware of 'Guidance for Public Health Management of Meningococcal Disease in the UK'[14]

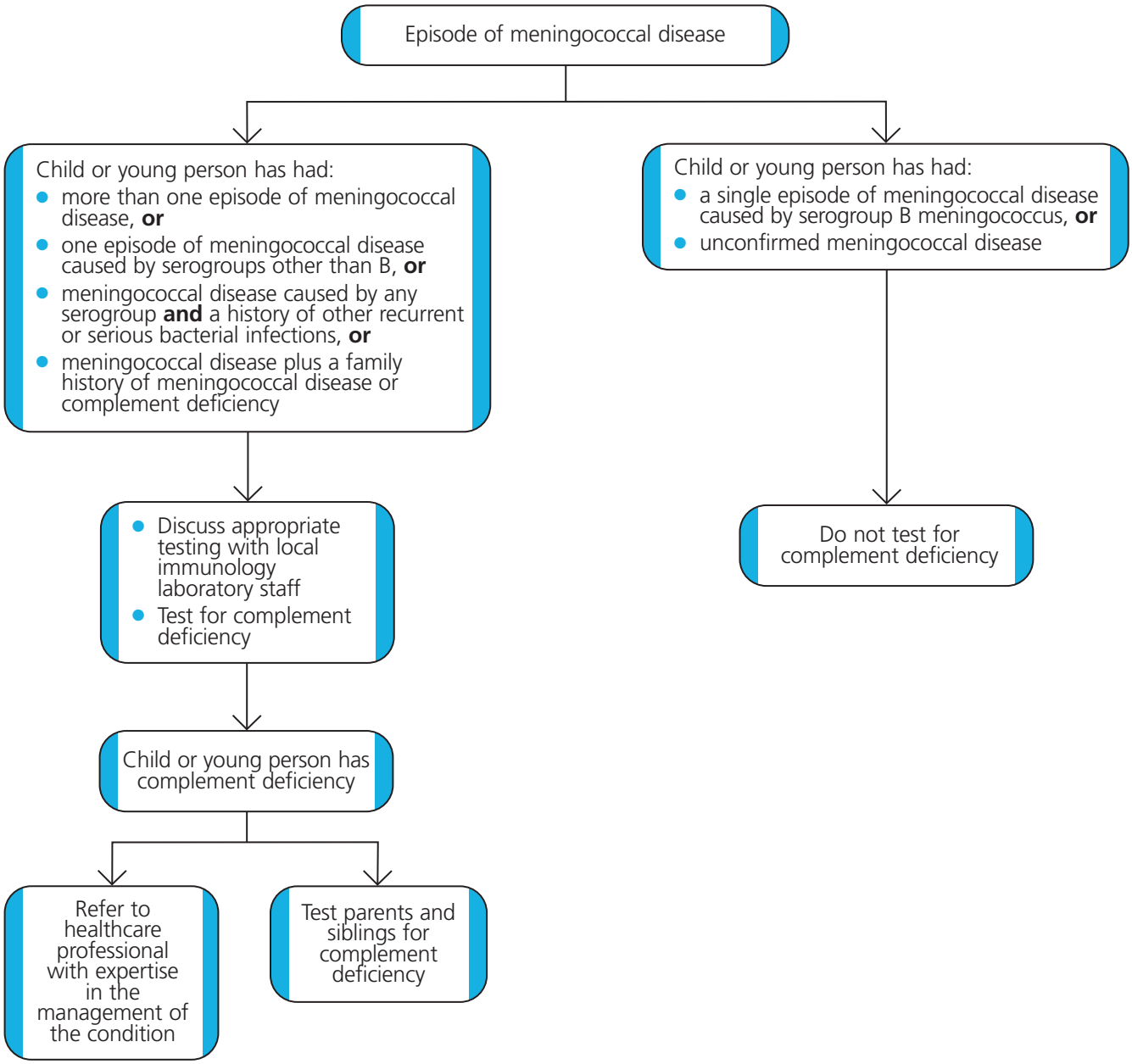
[11] See Medicines and Healthcare products Regulatory Agency (2009) Drug Safety Update Vol. 3 Issue 3. Available from www.mhra.gov.uk

[12] See National Patient Safety Agency (2007) Patient safety alert 22: Reducing the risk of hyponatraemia when administering intravenous infusions to children. Available from www.nrls.npsa.nhs.uk

[13] www.opsi.gov.uk. The Department of Health has issued guidance on health protection legislation which explains the notification requirements. See 'Health protection legislation guidance 2010' at www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_114510

[14] Health Protection Agency Meningococcus Forum, 2006; see www.hpa.org.uk

Immune testing in children and young people who have had meningococcal disease



- Children and young people with recurrent episodes of meningococcal disease should be assessed by a specialist in infectious disease or immunology.
- Do not test children and young people for immunoglobulin deficiency if they have had meningococcal disease, unless they have a history suggestive of an immunodeficiency.

Information for bacterial meningitis and meningococcal disease pathways

See the bacterial meningitis pathway and the meningococcal disease pathway on pages 12–17.

Box 1 Contraindications to lumbar puncture

- Signs suggesting raised intracranial pressure (see box 4)
- Shock
- Extensive or spreading purpura
- After convulsions until stabilised
- Coagulation abnormalities
  - coagulation results (if obtained) outside the normal range
  - platelet count below 100 x 10^9/litre
  - receiving anticoagulant therapy
- Local superficial infection at the lumbar puncture site
- Respiratory insufficiency (lumbar puncture is considered to have a high risk of precipitating respiratory failure in the presence of respiratory insufficiency)
- Radiological evidence of raised intracranial pressure

Box 2 Cranial CT scanning

- Perform a CT scan to detect alternative intracranial pathology if consciousness is reduced or fluctuating, or there are focal neurological signs.
- Do not delay treatment to undertake a CT scan.
- Clinically stabilise children and young people before CT scanning.
- If performing a CT scan consult an anaesthetist, paediatrician or intensivist.

Box 3 Long-term management

- Consider requirements for follow-up before discharge.
- Discuss likely patterns of recovery and potential long-term effects with the child or young person and their parents or carers.
- Offer information about further care and contact details of patient support organisations.
- Inform the child's or young person's GP, health visitor and school nurse about their bacterial meningitis.
- Healthcare professionals should be alert to possible late-onset sensory, neurological, orthopaedic and psychosocial effects.
- Offer a formal audiological assessment as soon as possible, within 4 weeks of being fit to test.
- Offer children and young people with severe or profound deafness an urgent assessment for cochlear implants as soon as they are fit to undergo testing[15].
- Children and young people should be reviewed by a paediatrician with the results of their hearing test 4–6 weeks after hospital discharge to discuss morbidities associated with their condition and offered referral to the appropriate services.

Box 4 Signs suggesting raised intracranial pressure

- Reduced or fluctuating level of consciousness
- Relative bradycardia and hypertension
- Focal neurological signs
- Abnormal posture or posturing
- Unequal, dilated or poorly responsive pupils
- Papilloedema
- Abnormal 'doll's eye' movements

[15] Further guidance on the use of cochlear implants for severe to profound deafness can be found in 'Cochlear implants for children and adults with severe to profound deafness' (NICE technology appraisal 166)

Box 5 Intubation and ventilation

A healthcare professional with expertise in paediatric airway management should undertake tracheal intubation.

Indications for tracheal intubation and mechanical ventilation

- Threatened or actual loss of airway patency
- Need for any form of assisted ventilation
- Clinical observation of increasing work of breathing
- Hypoventilation or apnoea
- Features of respiratory failure
- Continuing shock following infusion of a total of 40 ml/kg of resuscitation fluid
- Signs of raised intracranial pressure
- Impaired mental status
- Control of intractable seizures
- Need for stabilisation and management to allow brain imaging or transfer to the paediatric intensive care unit/another hospital

Preparation for intubation

Ensure that children and young people with suspected or confirmed bacterial meningitis or meningococcal septicaemia are nil by mouth from admission to hospital and that the following are available before intubation:

- facilities to administer fluid boluses
- appropriate vasoactive drugs
- access to a healthcare professional experienced in the management of critically ill children.

Healthcare professionals should be trained in the recognition and management of meningococcal disease

Diagnosis in secondary care

See the bacterial meningitis pathway on pages 12–14 and the meningococcal disease pathway on pages 16–17.

Tests for suspected bacterial meningitis

- In suspected bacterial meningitis perform a CRP and white blood cell count.
  - If there is a raised CRP and/or white blood cell count and an abnormal CSF, treat as bacterial meningitis.
  - Do not rule out bacterial meningitis if CRP and white blood cell count are normal.
  - If no CSF is available or the CSF findings are uninterpretable, manage as confirmed meningitis.

PCR tests for bacterial meningitis and meningococcal disease

- Perform whole blood real-time PCR testing (EDTA sample) for *N meningitidis* to confirm a diagnosis of meningococcal disease.
- Take the PCR blood sample as soon as possible.
- Use PCR testing of blood samples from other hospital laboratories if available, to avoid repeating the test.
- Do not rule out meningococcal disease if a blood PCR test result for *N meningitidis* is negative.

Lumbar puncture and CSF investigations

- Perform a lumbar puncture as a primary investigation unless this is contraindicated.
- If there are contraindications, consider delaying lumbar puncture until there are no longer contraindications.
- Do not allow lumbar puncture to delay the administration of parenteral antibiotics.
- Submit CSF to the laboratory to hold for PCR testing for *N meningitidis* and *S pneumoniae*, but only perform the PCR testing if the CSF culture is negative.
- Be aware that CSF samples taken up to 96 hours after admission to hospital may give useful PCR results.
- CSF examination should include white blood cell count and examination, total protein and glucose concentrations, Gram stain and microbiological culture. A corresponding laboratory-determined blood glucose concentration should be measured.
- CSF white blood cell counts, total protein and glucose concentrations should be made available within 4 hours to support the decision regarding adjunctive steroid therapy.
- In suspected bacterial meningitis, consider alternative diagnoses if the child or young person is significantly ill and has CSF variables within the accepted normal ranges.
- Consider herpes simplex encephalitis as an alternative diagnosis.

Repeat lumbar puncture in neonates

- Perform a repeat lumbar puncture in neonates with:
  - persistent or re-emergent fever
  - deterioration in clinical condition
  - new clinical findings (especially neurological findings) or
  - persistently abnormal inflammatory markers.
- Do not perform a repeat lumbar puncture in neonates:
  - who are receiving the antibiotic treatment appropriate to the causative organism and are making a good clinical recovery
  - before stopping antibiotic therapy if they are clinically well.

Skin samples and throat swabs for meningococcal disease

- Do not use any of the following techniques when investigating for possible meningococcal disease: skin scrapings, skin biopsies, petechial or purpuric lesion aspirates (obtained with a needle and syringe), or throat swabs.

Management in secondary care

See the bacterial meningitis pathway on pages 12–14 and the meningococcal disease pathway on pages 16–17.

Corticosteroids

Bacterial meningitis

- Do not use corticosteroids in children younger than 3 months with suspected or confirmed bacterial meningitis.
- If dexamethasone was not given before or with the first dose of antibiotics, but was indicated, try to administer the first dose within 4 hours of starting antibiotics, but do not start dexamethasone more than 12 hours after starting antibiotics.
- After the first dose of dexamethasone discuss the decision to continue dexamethasone with a senior paediatrician.

Meningococcal septicaemia

- Do not treat meningococcal septicaemia with high-dose corticosteroids (defined as dexamethasone 0.6 mg/kg/day or an equivalent dose of other corticosteroids).
- In children and young people with shock that is unresponsive to vasoactive agents, steroid replacement therapy using low-dose corticosteroids (hydrocortisone 25 mg/m^2 four times daily) should be used only when directed by a paediatric intensivist.

Adjunctive therapies

- Do not use activated protein C or recombinant bacterial permeability-increasing protein in children and young people with meningococcal septicaemia.

Further information

Ordering information

You can download the following documents from **www.nice.org.uk/guidance/CG102**

- The NICE guideline – all the recommendations.
- A quick reference guide (this document) – a summary of the recommendations for healthcare professionals.
- 'Understanding NICE guidance' – a summary for patients and carers.
- The full guideline – all the recommendations, details of how they were developed, and reviews of the evidence they were based on.

For printed copies of the quick reference guide or 'Understanding NICE guidance', phone NICE publications on 0845 003 7783 or email publications@nice.org.uk and quote:

- N2201 (quick reference guide)
- N2202 ('Understanding NICE guidance').

Implementation tools

NICE has developed tools to help organisations implement this guidance (see **www.nice.org.uk/guidance/CG102**).

Related NICE guidance

For information about NICE guidance that has been issued or is in development, see **www.nice.org.uk**

Published

- Diarrhoea and vomiting caused by gastroenteritis: diagnosis, assessment and management in children younger than 5 years. NICE clinical guideline 84 (2009). Available from **www.nice.org.uk/guidance/CG84**
- Feverish illness in children. Assessment and initial management in children younger than 5 years. NICE clinical guideline 47 (2007). Available from **www.nice.org.uk/guidance/CG47**
- Tuberculosis. Clinical diagnosis and management of tuberculosis, and measures for its prevention and control. NICE clinical guideline 33 (2006). Available from **www.nice.org.uk/guidance/CG33**
- Cochlear implants for children and adults with severe to profound deafness. NICE technology appraisal 166 (2009). Available from **www.nice.org.uk/guidance/TA166**

Updating the guideline

This guideline will be updated as needed, and information about the progress of any update will be available at **www.nice.org.uk/guidance/CG102**

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