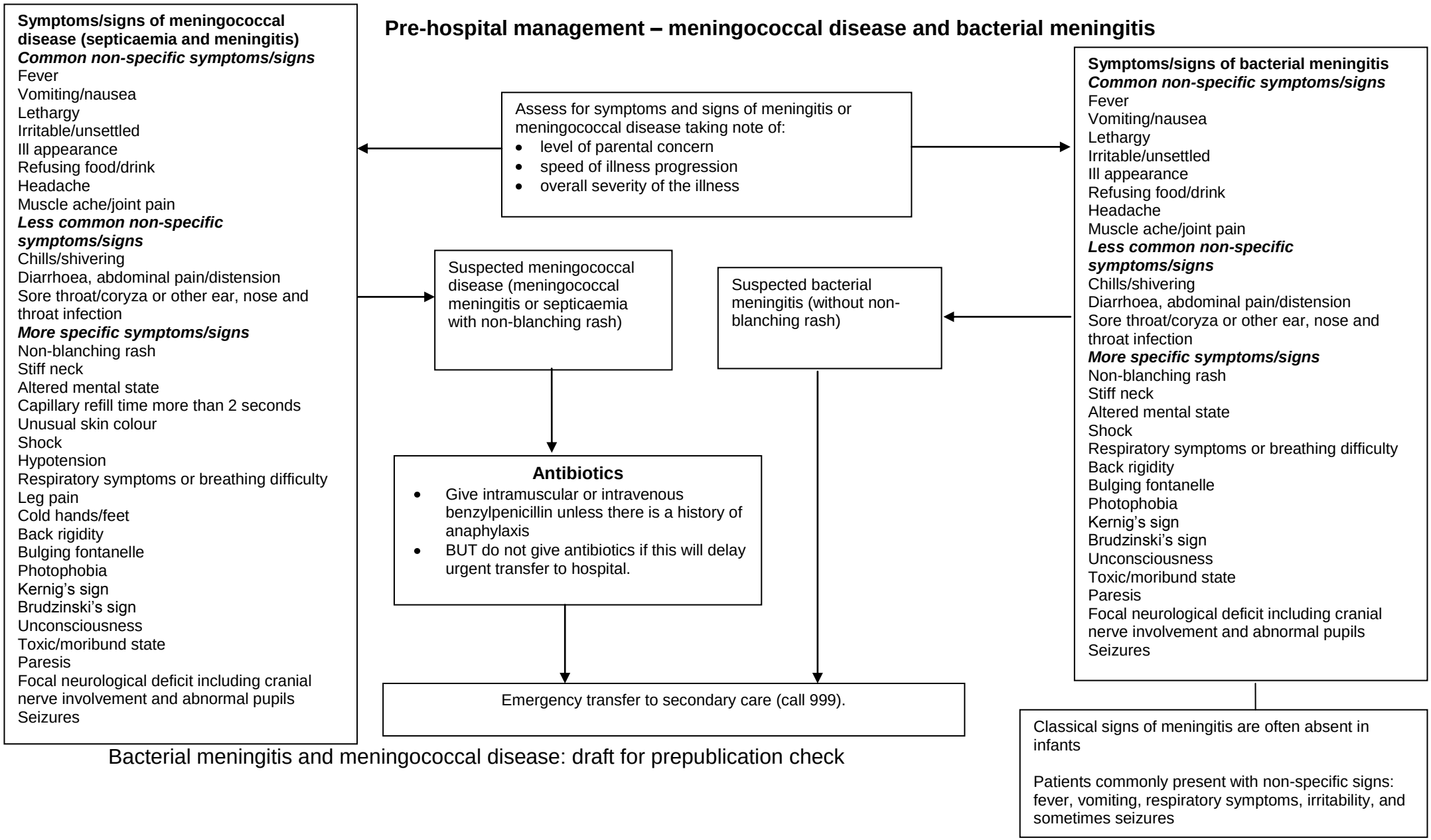
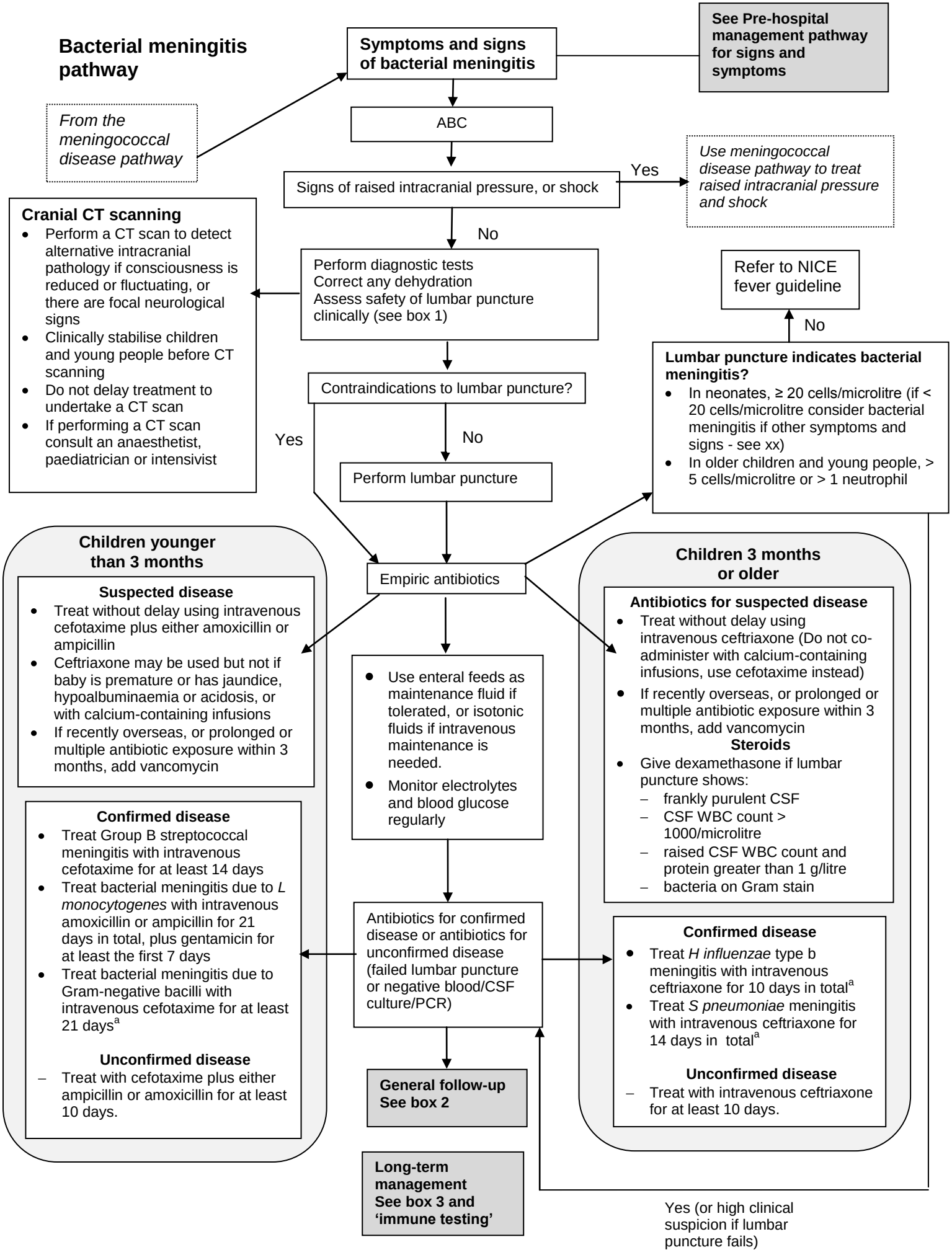
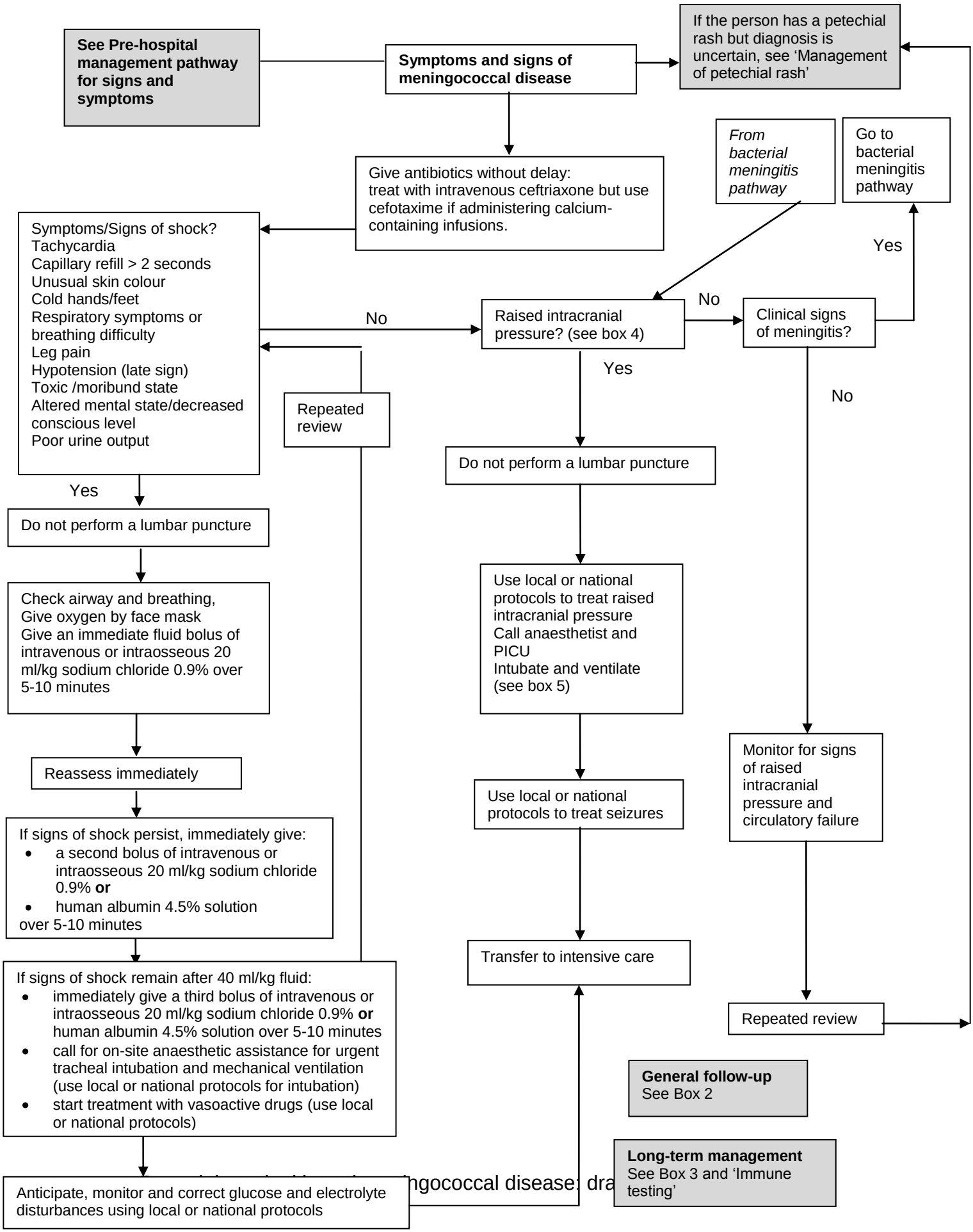
## Pre-hospital management – meningococcal disease and bacterial meningitis

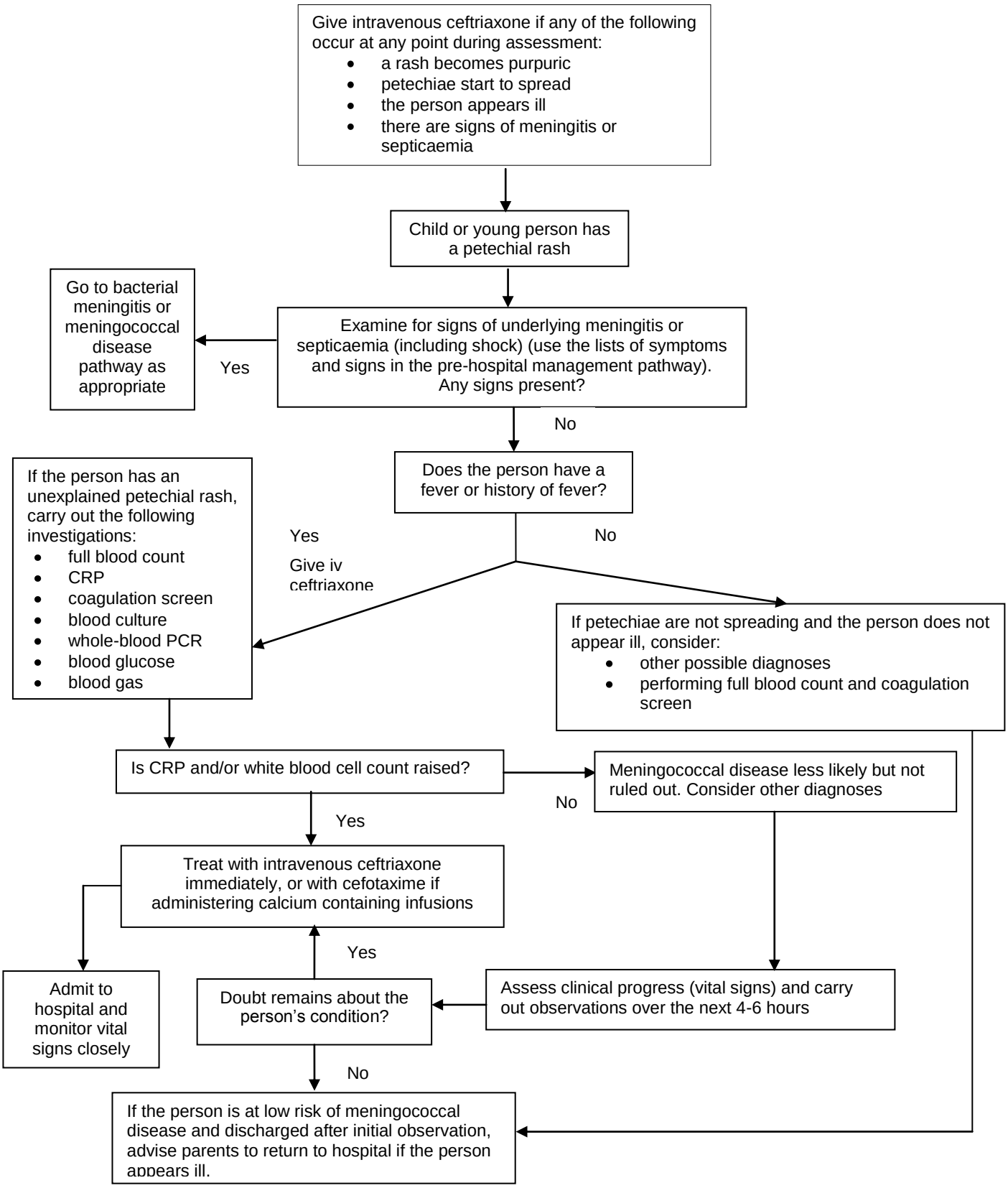



Bacterial meningitis pathway
Symptoms and signs of bacterial meningitis
See Pre-hospital management pathway for signs and symptoms
From the meningococcal disease pathway
ABC
Signs of raised intracranial pressure, or shock
Yes
Use meningococcal disease pathway to treat raised intracranial pressure and shock
No
Cranial CT scanning
Perform a CT scan to detect alternative intracranial pathology if consciousness is reduced or fluctuating, or there are focal neurological signs
Clinically stabilise children and young people before CT scanning
Do not delay treatment to undertake a CT scan
If performing a CT scan consult an anaesthetist, paediatrician or intensivist
Perform diagnostic tests
Correct any dehydration
Assess safety of lumbar puncture clinically (see box 1)
Refer to NICE fever guideline
No
Lumbar puncture indicates bacterial meningitis?
In neonates, ≥ 20 cells/microlitre (if < 20 cells/microlitre consider bacterial meningitis if other symptoms and signs - see xx)
In older children and young people, > 5 cells/microlitre or > 1 neutrophil
Contraindications to lumbar puncture?
Yes
No
Perform lumbar puncture
Children younger than 3 months
Suspected disease
Treat without delay using intravenous cefotaxime plus either amoxicillin or ampicillin
Ceftriaxone may be used but not if baby is premature or has jaundice, hypoalbuminaemia or acidosis, or with calcium-containing infusions
If recently overseas, or prolonged or multiple antibiotic exposure within 3 months, add vancomycin
Confirmed disease
Treat Group B streptococcal meningitis with intravenous cefotaxime for at least 14 days
Treat bacterial meningitis due to L monocytogenes with intravenous amoxicillin or ampicillin for 21 days in total, plus gentamicin for at least the first 7 days
Treat bacterial meningitis due to Gram-negative bacilli with intravenous cefotaxime for at least 21 days[a]
Unconfirmed disease
Treat with cefotaxime plus either ampicillin or amoxicillin for at least 10 days.
Empiric antibiotics
Use enteral feeds as maintenance fluid if tolerated, or isotonic fluids if intravenous maintenance is needed.
Monitor electrolytes and blood glucose regularly
Antibiotics for confirmed disease or antibiotics for unconfirmed disease (failed lumbar puncture or negative blood/CSF culture/PCR)
General follow-up
See box 2
Long-term management
See box 3 and 'immune testing'
Children 3 months or older
Antibiotics for suspected disease
Treat without delay using intravenous ceftriaxone (Do not co-administer with calcium-containing infusions, use cefotaxime instead)
If recently overseas, or prolonged or multiple antibiotic exposure within 3 months, add vancomycin
Steroids
Give dexamethasone 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
Confirmed disease
Treat H influenzae type b meningitis with intravenous ceftriaxone for 10 days in total[a]
Treat S pneumoniae meningitis with intravenous ceftriaxone for 14 days in total[a]
Unconfirmed disease
Treat with intravenous ceftriaxone for at least 10 days.
Yes (or high clinical suspicion if lumbar puncture fails)

# Meningococcal disease pathway



## Management of petechial rash



**Box 1. Contraindications to lumbar puncture**

- Signs suggesting raised intracranial pressure (see box 4)
- Radiological evidence of raised intracranial pressure
- Uncorrected shock
- Extensive or spreading purpura
- After convulsions
  - within 30 minutes of a generalised seizure lasting 30 minutes or less
  - following a prolonged generalised seizure (lasting more than 30 minutes) in those ≥ 28 days old
  - following a tonic seizure in those ≥ 28 days old
- 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)

**Box 2. General follow-up**

- 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

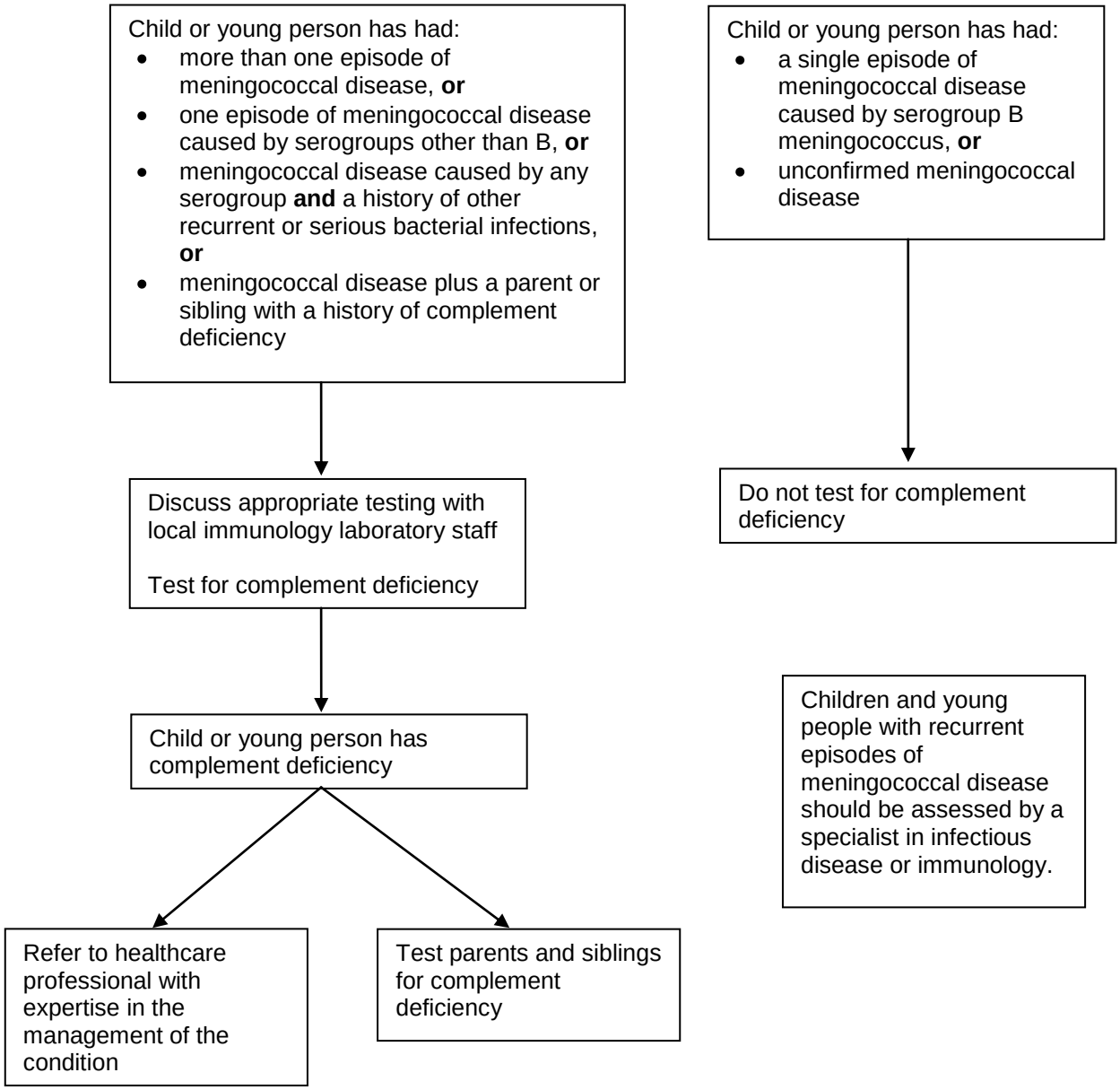
**Box 3. Long-term management**

**Long-term effects**

- Offer a formal audiological assessment
- Offer children and young people with severe or profound deafness an assessment for cochlear implants as soon as they are fit to undergo testing[1]
- 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

[1] See 'Cochlear implants for severe to profound deafness in children and adults' (NICE technology appraisal 166)

## Immune testing



**Box 4 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) in those ≥ 28 days old
- Relative bradycardia and hypertension
- Focal neurological signs
- Abnormal posture or posturing
- Unequal, dilated or poorly responsive pupils
- Papilloedema
- Abnormal 'doll's eye' movements

**Box 5 Indications for tracheal intubation and mechanical ventilation**

- threatened or actual loss of airway patency
- the 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 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 or another hospital.