Assess for symptoms and signs of meningitis or meningococcal disease taking note of:
- level of parental concern
- speed of illness progression
- overall severity of the illness

Suspected meningococcal disease (meningococcal meningitis or septicaemia with non-blanching rash)

Suspected bacterial meningitis (without non-blanching rash)

Antibiotics
- Give intramuscular or intravenous benzylpenicillin unless there is a history of anaphylaxis
- BUT do not give antibiotics if this will delay urgent transfer to hospital.

Emergency transfer to secondary care (call 999).

Classical signs of meningitis are often absent in infants
Patients commonly present with non-specific signs: fever, vomiting, respiratory symptoms, irritability, and sometimes seizures
Bacterial meningitis and meningococcal disease: draft for prepublication check
Meningococcal disease pathway

See Pre-hospital management pathway for signs and symptoms

Symptoms and signs of meningococcal disease

Give antibiotics without delay: treat with intravenous ceftriaxone but use cefotaxime if administering calcium-containing infusions.

If the person has a petechial rash but diagnosis is uncertain, see ‘Management of petechial rash’

From bacterial meningitis pathway

Go to bacterial meningitis pathway

Yes

No

Clinical signs of meningitis?

Yes

No

Raised intracranial pressure? (see box 4)

Use local or national protocols to treat raised intracranial pressure

Call anaesthetist and PICU

Intubate and ventilate (see box 5)

Use local or national protocols to treat seizures

Transfer to intensive care

Repeated review

Monitor for signs of raised intracranial pressure and circulatory failure

General follow-up

See Box 2

Long-term management

See Box 3 and ‘Immune testing’

Yes

No

Do not perform a lumbar puncture

Check airway and breathing, Give oxygen by face mask

Give an immediate fluid bolus of intravenous or intraosseous 20 ml/kg sodium chloride 0.9% over 5-10 minutes

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 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 on-site 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)

Anticipate, monitor and correct glucose and electrolyte disturbances using local or national protocols

Symptoms/Signs of shock?

Tachycardia
Capillary refill > 2 seconds
Unusual skin colour
Cold hands/feet
Respiratory symptoms or breathing difficulty
Leg pain
Hypotension (late sign)
Toxic/moribund state
Altered mental state/decreased conscious level
Poor urine output

Yes

No

Raised intracranial pressure?

Repeat review
Management of petechial rash

Give intravenous ceftriaxone if any of the following occur at any point during assessment:
- a rash becomes purpuric
- petechiae start to spread
- the person appears ill
- there are signs of meningitis or sepsis

Child or young person has a petechial rash

Examine for signs of underlying meningitis or sepsis (including shock) (use the lists of symptoms and signs in the pre-hospital management pathway). Any signs present?

If petechiae are not spreading and the person does not appear ill, consider:
- other possible diagnoses
- performing full blood count and coagulation screen

If the person has an unexplained petechial rash, carry out the following investigations:
- full blood count
- CRP
- coagulation screen
- blood culture
- whole-blood PCR
- blood glucose
- blood gas

Yes

Go to bacterial meningitis or meningococcal disease pathway as appropriate

No

Does the person have a fever or history of fever?

Yes

Give iv ceftriaxone

If petechiae are not spreading and the person does not appear ill, consider:
- other possible diagnoses
- performing full blood count and coagulation screen

No

Is CRP and/or white blood cell count raised?

Yes

Treat with intravenous ceftriaxone immediately, or with cefotaxime if administering calcium containing infusions

Admit to hospital and monitor vital signs closely

No

Meningococcal disease less likely but not ruled out. Consider other diagnoses

Assess clinical progress (vital signs) and carry out observations over the next 4-6 hours

If petechiae are not spreading and the person does not appear ill, consider:
- other possible diagnoses
- performing full blood count and coagulation screen

If petechiae are not spreading and the person does not appear ill, consider:
- other possible diagnoses
- performing full blood count and coagulation screen

If the person is at low risk of meningococcal disease and discharged after initial observation, advise parents to return to hospital if the person appears ill.
## 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

Child or young person has had:
- more than one episode of meningococcal disease, or
- one episode of meningococcal disease caused by serogroups other than B, or
- meningococcal disease caused by any serogroup and a history of other recurrent or serious bacterial infections, or
- meningococcal disease plus a parent or sibling with a history of complement deficiency

Discuss appropriate testing with local immunology laboratory staff

Test for complement deficiency

Child or young person has complement deficiency

Refer to healthcare professional with expertise in the management of the condition

Test parents and siblings for complement deficiency

Children and young people with recurrent episodes of meningococcal disease should be assessed by a specialist in infectious disease or immunology.

Child or young person has had:
- a single episode of meningococcal disease caused by serogroup B meningococcus, or
- unconfirmed meningococcal disease

Do not test for complement deficiency
### 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.