

POLICY FOR TREATMENT OF CENTRAL NERVOUS SYSTEM INFECTIONS IN ADULTS

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**Amendment
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For Review:

Formulary guidance holds the same status as Trust policy

Amendment table

Version	Date Issued	Brief Summary of Changes	Author
4	Oct 2025	<ul style="list-style-type: none">• Risk factors added• LP contra-indications updated• Infection specialist input advice expanded• Syphilis & HIV testing recommendation added• Follow up advice added• HSV encephalitis diagnostic advice expanded	Dr Bala Subramanian Dr Daniel Baynes

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4) AVAILABLE RESOURCES

1) Meningitis

Definition

Inflammation of the meninges – may be bacterial, viral or aseptic meningitis. The classic triad of fever, neck stiffness and altered mental status (GCS \leq 14) is not always present. May have signs specific to the infecting organism e.g. purpuric rash in meningococcal meningitis. In culture-proven bacterial meningitis:

95% of patients have 2 of the following symptoms and signs

99% of patients have at least 1

- Headache
- Fever
- Neck stiffness
- Altered mental state

Viral meningitis is thought to account for about 50 – 80% of all cases of 'meningitis'.

Risk Factors

Some patient groups are at higher risk of bacterial meningitis. Risk factors include:

- Missing relevant immunisations, such as meningococcal, Haemophilus influenzae type b (Hib) or pneumococcal vaccines
- Reduced or absent spleen function
- Congenital complement deficiency or acquired inhibition
- Being a student in further or higher education, particularly in large shared accommodation (such as halls of residence)
- Family history of meningococcal disease
- Contact with someone with Hib disease or meningococcal disease, or having been in an area with an outbreak of meningococcal disease
- Previous episode of bacterial meningitis or meningococcal disease
- Cerebrospinal fluid leak
- Cochlear implants

Common causative organisms

Bacterial meningitis	Viral meningitis
<ul style="list-style-type: none">• <i>Neisseria meningitidis</i>• <i>Haemophilus influenzae, type B</i>• <i>Streptococcus pneumoniae</i>• <i>Listeria monocytogenes</i> (especially in patients who are immunocompromised, diabetic or alcohol dependent)• <i>M.tuberculosis</i>	<ul style="list-style-type: none">• <i>Herpes simplex virus(HSV)-usually HSV-2</i>• <i>Varicella Zoster virus(VZV)</i>• <i>Enterovirus</i>

Please note: In house CSF PCR testing is available at DRI labs to facilitate rapid diagnosis and rationalisation of antimicrobials. If PCR is negative it's likely to be safe to stop antibiotics- please discuss with infection specialist if advice is needed and exercise special caution if HSV encephalitis is suspected (see below).

Notification to Health Protection team

- All cases of meningitis (regardless of aetiology) should be notified to the local HPT
- Please refer to '[PAT/IC 12 Meningococcal Infections – Management of Cases and Contacts](#)'

Management of Suspected Meningitis

Contraindications to immediate LP? Focal neurological signs, abnormal pupillary reactions, continuous/uncontrolled seizures, rapidly spreading purpura, GCS 9 or less or a progressive and sustained or rapid fall in conscious level

No

Yes

If delay in LP >1 hour, start empirical antibiotics

Urgent CT

Alternative diagnosis?

Yes

Treat as appropriate

No

Radiological contraindication to LP?

No

Yes

Start empirical antibiotics

Perform LP sending CSF for following:

- Opening pressure
- Cell count, microscopy & culture (Bottles 1 & 3). If CSF WCC >5, PCRs will be performed using QIAstat with same day results
- Biochemistry – Protein, glucose (Bottle 2)

If TB meningitis is suspected, take large volume sample >10mls for AAFB & culture

1st line

2nd line or if history of Penicillin anaphylaxis

Duration

Adults < 60 years

Ceftriaxone (IV) 2g 12-hourly

Chloramphenicol* (IV) 25mg/kg 6-hourly for 48h, then reduce to 12.5mg/kg 6-hourly

Meningococcal – 5 days if good clinical recovery
Pneumococcal – 10 - 14 days

Adults ≥ 60 years
Immunocompromised,
diabetes or alcohol excess

Ceftriaxone (IV) 2g 12-hourly
AND
Amoxicillin* (IV) 2g 4-hourly

(OR if rash allergy to Penicillin,
Co-trimoxazole IV 120mg/kg in 4 divided doses

Chloramphenicol* (IV) 25mg/kg 6-hourly for 48h, then reduce to 12.5mg/kg 6-hourly
AND
Co-trimoxazole* (IV) 120mg/kg in 4 divided doses

Haemophilus influenzae – 7-10 days
Listeria – 21 days
Enterobacteriales (eg E.coli)- 21 days
Viral – Stop antibiotics, treatment is supportive

If travel in last 6 months to country with high penicillin resistance

Discuss further with Consultant in Infection
High risk countries include: *China, South Korea, Taiwan, Turkey, India, Brazil, Malaysia, South Africa, Columbia, Canada, Croatia, Greece, Italy, Mexico, Pakistan, Poland, Spain*

All cases of suspected bacterial meningitis should receive IV dexamethasone 8.3mg QDS within 12 hours of first dose of antibiotic. If pneumococcal or *H. influenzae* meningitis is confirmed, then continue dexamethasone for total 4 days. Immunocompromised patients: Consider atypical pathogens and early discussion with infection specialist

*May need dose adjustment in renal impairment. Discuss with Pharmacist if required.

Additional Testing

- 2 sets of blood cultures (preferably before antibiotics)
- Pneumococcal and Meningococcal PCR on blood
- Blood borne virus screening (HIV Ab/Ag, HBsAg, HCV Ab) and syphilis serology
- Bacterial throat swab for MC+S
- If viral meningitis is likely: viral throat swab for respiratory viruses and enterovirus and stool for enterovirus PCR
- If HIV positive please discuss with Infection specialist at DBTH or STH.
- CSF PCR testing will be performed based on clinical information and CSF results. If additional CSF PCR testing is required, please discuss with Consultant in Infection

Follow Up

- Consider referral of all cases of confirmed bacterial meningitis for outpatient follow up with infectious diseases team (dbth.idconsult@nhs.net or paper referral)
- Refer all patients with bacterial meningitis for audiology assessment within four weeks of illness either as an inpatient or after discharge

2) Meningococcal sepsis

Definition

Evidence of sepsis +/- characteristic petechial/purpuric skin rash and hypoperfusion. *Neisseria meningitidis* may be identified from blood, CSF or skin lesions.

Patients with meningococcal septicaemia can deteriorate rapidly. The classic petechial or purpuric rash occurs in \approx 60%, but this can be a late sign. Certain symptoms that should raise alarm are severe muscle pain (a possible feature of systemic bacterial sepsis) or thirst (a prominent feature of impending shock even when the blood pressure is normal). Temperature may be high, low or normal.

Common causative organism	Microbiological Investigations
<i>Neisseria meningitidis</i>	<ul style="list-style-type: none">• Blood cultures• Meningococcal and pneumococcal PCR (1 x EDTA tube to microbiology)• Throat swab for MC&S Note: LP should NOT be performed in these patients.

Treatment

1 st line	Penicillin anaphylaxis	Duration
Ceftriaxone (IV) 2g every 12h	Chloramphenicol (IV) 25mg/kg 6-hourly	5 days (provided good clinical recovery)

3) Encephalitis

Definition

Inflammation of the brain substance. Involvement of particular areas of the brain can occur with specific pathogens. Usually presents with headache, fever, change in cognitive state (e.g. confusion, personality change) though not all features may be present. Focal features, such as reduced GCS or seizures, may occur.

The most frequent cause of encephalitis in the UK is HSV-1. It tends to affect the temporal and/or frontal lobes. Bacterial, parasitic and fungal causes are rare in the UK. However, if there is a relevant travel history and additional CSF PCR testing is needed, discuss with Infection specialist

Common causative organisms	Microbiological Investigations	Additional tests
<p>Herpes simplex virus (HSV) – usually HSV-1</p> <p>Varicella zoster virus (VZV)</p> <p>Enterovirus</p>	<ul style="list-style-type: none"> Blood cultures Lumbar puncture CSF microscopy, culture CSF PCR testing will be done (using QIAstat with same day results) if CSF WCC >5 or where there is high suspicion for encephalitis (please indicate this on the request form) Throat swab & stool for enterovirus PCR If vesicles present, send viral skin swabs Meningococcal and pneumococcal PCR (EDTA sample) to help rule out bacterial meningo-encephalitis HIV test <p>NB -Additional CSF investigations may be indicated if immunocompromised, recent travel or if at risk exposure. E.g Toscana virus (Mediterranean), Tick Borne encephalitis virus (Central/Eastern Europe), West Nile Virus (USA), Lyme disease (appropriate exposure in Europe or USA) or parasitic.</p> <p>Please discuss with Consultant in Infection/Infectious Diseases.</p>	<ul style="list-style-type: none"> MRI brain with contrast Consider EEG

Treatment

Treatment of patients early in the course of the illness, before the development of necrosis, is essential for better outcome.

1 st line	Duration
<p>Aciclovir 10mg/kg 8-hourly (IV)</p> <p>In obese patients, ideal body weight should be used to calculate dose, to avoid excessive doses.</p> <p><u>Ideal body weight (IBW) calculation:</u> Female IBW (kg) = height (cm) -105 Male IBW (kg) = height – 100</p>	<ul style="list-style-type: none"> If proven HSV encephalitis, continue aciclovir for 14 days (or 21 days if immunocompromised) Repeat LP at the end of treatment to confirm that HSV PCR negative before stopping treatment If CSF still positive, then continue treatment with weekly LPs until HSV PCR negative Maintain good hydration and monitor U&E whilst on aciclovir

Note:

HSV PCR may be negative in the first few days of illness. If the initial LP is done < 72 hours of symptom onset and HSV PCR is negative, then consider repeat LP. A high clinical index of suspicion should be maintained even if CSF WCC is low or the patient is afebrile, as neither of these factors exclude HSV encephalitis.

Suspected CJD

Please refer to DBTH CJD Trust Policy '[PAT/IC 4 – Variant Creutzfeldt-Jakob Disease \(vCJD\) and Transmissible Spongiform Encephalopathy Agents \(TSE\): Minimising the Risks of Transmission](#)'

Infection Specialist Input

Please discuss all cases of suspected or confirmed CNS infection with an infection specialist – either the microbiology consultant 24/7 or for clinical review the infectious diseases team via an inpatient referral form or dbth.idconsult@nhs.net

Useful Resources

- British Infection Association Infection Quick Reference Guide (IQRG) Meningitis and Encephalitis 2024 [Investigation of Meningitis and Encephalitis\[2\]](#)
- NICE guideline NG240 Meningitis (bacterial) and meningococcal disease: recognition, diagnosis and management [Meningitis - bacterial meningitis and meningococcal disease | Health topics A to Z | CKS | NICE](#)

References

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British Infection Association Infection Quick Reference Guide (IQRG) Meningitis and Encephalitis 2024 [Investigation of Meningitis and Encephalitis\[2\]](#)

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