

South-West Critical Care Network (SWCCN)

Southmead Hospital, Bristol Foundation Trust & University Hospitals Plymouth Trust

Central Nervous System (CNS) Infection Referral Pathway

Scope: This guideline has been produced to aid the referral and appropriate acceptance and transfer of patients across the SWCCN presenting with severe CNS infections requiring management in a specialist neurocritical care setting. It has been produced through collaboration between the South West Critical Care Network, Bristol NHS Foundation Trust and University Hospitals Plymouth Trust.

Version 1.1	Valid from 14/10/2026	Review due 14/10/2027	Authors: Stephen Spencer, Charis Banks, Kate Crewdson, Andy Georgiou, Rob Jackson Approval: SWCCN board 14/10/2026, Consultants at Southmead BFT and UHP.
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1. Background

The majority of critically ill patients with acute CNS infections can, and should, be managed within the critical care unit of the hospital where they first present to secondary care. However, a subgroup of patients either develop, or are at risk of developing, raised intracranial pressure (ICP). The optimal management of these patients is not clearly specified within current national guidance.

There is evidence in the literature suggesting that the use of ICP monitoring, with or without cerebrospinal fluid (CSF) diversion, may reduce both morbidity and mortality. Conversely, these interventions are not without risk, and decisions regarding their use should be individualised and informed by multidisciplinary discussion between experts in neurocritical care, neurosurgery, and infectious diseases^{1,2}. In hospitals without on-site neurocritical care services, establishing these multidisciplinary discussions can be challenging, particularly as acute meningitis and encephalitis are often perceived as conditions not routinely requiring neurosurgical involvement.

To address this, the South-West Critical Care Network has collaborated with the neurocritical care centres at Southmead and Derriford Hospitals to develop a standardised referral pathway for implementation across the Network. The aim is to provide a clear referral and acceptance process, improving both the quality and equity of care for this patient group. Importantly, this pathway is not intended to be applied to all patients with acute CNS infections, but rather to those in whom raised ICP is suspected or identified as a significant clinical concern.

2. Referral Criteria

Patients must meet the following criteria:

- Confirmed (or high clinical suspicion of) CNS infection
AND
- Intubated and ventilated

PLUS at least **one** of the following:

- Raised ICP; defined as:
 - Radiographic (e.g. CT) features of raised ICP, for example:
 - effacement of the sulci, basal cisterns and ventricles
 - hydrocephalus
 - brain herniation
 - and/or**
 - Clinical findings indicating raised ICP:
 - emergence of a fixed, dilated pupil.
 - seizures
 - papilloedema on fundoscopy.
- Neurosurgical intervention indicated.

Exclusion criteria:

- Pathology requiring direct neurosurgical referral (such as focal collection/empyema)
- <16 years
- Patient factors where ongoing critical care support would not benefit their overall outcome in terms of morbidity or mortality.

3. Pathway

Trigger: Patient meets referral criteria

For units who usually refer to Southmead:

1. Referral to ICU consultant via telephone **0117 4141499** and **referapatient** (Southmead Critical Care CNS Pathway)
2. Ensure all imaging shared with Southmead PACS system.
3. Start neuroprotective optimisation (see appendix 2)
4. If accepted by Southmead ICU consultant, please contact Retrieve to arrange transfer (phone number: 0300 030 2222) and complete retrieve pre-transfer checklist

For units who usually refer to University Hospitals Plymouth:

1. Referral to ICU consultant via switchboard **01752 202082**.
2. Ensure all imaging shared with University Hospitals Plymouth PACS system.
3. Start neuroprotective optimisation (see appendix 2)
4. If accepted by University Hospitals Plymouth ICU consultant, please contact Retrieve to arrange transfer (phone number: 0300 030 2222) and complete retrieve pre-transfer checklist

3.1 Repatriation

When the patient is no longer requiring neurocritical care or specialist management they should be repatriated as per the SWCCN guidance.

4.1 Appendix 1

A) Actions and roles of accepting Southmead ICU team

1. Inform ICU nurse in charge to organise level 3 bed.
2. Admit under Infectious Diseases team:
 - Identify name of Infectious Diseases (ID) consultant on-call from Southmead Hospital switchboard. Patient to be formally admitted under ID consultant.
 - All patients should be notified to ID via Careflow:
"Infectious Disease – Referrals"
 - ID will review in daytime hours.
 - For urgent cases contact ID registrar at Southmead (bleep: 9290; daytime hours only).
3. Early neurosurgical referral for their opinion regarding:
 - ICP monitor insertion
 - External ventricular drain (EVD) insertionContact registrar via phone on ext: 45726 and complete referapatient.org referral.
4. Refer to ENT for early (<24h) review if suspected ENT source of infection (e.g. sinusitis, mastoiditis). ENT to advise on:
 - Benefit of source control
 - Timing of surgical intervention if indicatedContact BRI switchboard on ext: 2100. Request to speak to ENT registrar on call for adults.

B) Initial assessment and management on arrival in Southmead ICU:

Role of ICU resident doctor

1. ICU registrar (9037 bleep holder) to meet Retrieve team at bedside to receive handover.
2. Immediate A to E assessment and confirm neuroprotective care in place.
See Appendix 2.
3. Document full neurological assessment.
4. Take blood cultures ± additional microbiology. Due to concern of raised intracranial pressure do not proceed with lumbar puncture until discussion with ICU consultant (see Appendix 3).

5. Prescribe empirical antimicrobial therapy (once allergy status confirmed). If allergies preclude empirical therapy please contact microbiology for advice.
 - Ceftriaxone 2g IV BD
 - Aciclovir 10mg/kg IV TDS
 - Dexamethasone 10mg IV QDS for 4 days (start before or within 12 hours of the first dose of antibacterial).
 - If patient ≥ 60 years, pregnant or immunocompromised (e.g. overt immunocompromise from illness or medications, or those with relative immunocompromise from diabetes mellitus, a history of alcohol misuse or malignancy)³:
 - Add amoxicillin 2g IV 4 hrly (if penicillin allergic then prescribe co-trimoxazole 30mg/kg QDS).
 - Refer to hospital antimicrobial guidelines
 - If evidence of renal impairment, consult renal handbook for dosing guidance (adjustment, avoidance, or alternative agents as appropriate)
6. Complete admission documentation.
7. Arrange urgent repeat neuroimaging:
 - CT head + CT venogram (CTV) if not already done.
 - Ensure CT head stealth scan if neurosurgical intervention planned
 - Repeat imaging if worsening neurology during transfer (for example, new pupillary changes, new seizures or posturing, focal neurological deficits, bradycardia with elevated blood pressure)
 - Liaise with advanced trainee or consultant if uncertain about need or modality.

If patient deteriorates neurologically at any point, then please ensure review by registrar and discuss with the responsible ICU consultant.

4.2 Appendix 2

Medical neuroprotective management

All sedated patients should have consideration of intracranial pressure monitoring.

All patients with suspected or confirmed raised ICP should be managed according to the following physiological goals until stated otherwise by the ICU consultant:

- CPP 60-70mmHg; target a MAP 80-90 in the absence of an ICP monitor – ensure arterial line transducer at level of tragus.
- Target euvolaemia (avoid hypotonic fluids)
- Use vasopressors/inotropes as required, early FICE echo if escalating support
- Head up tilt 30°
- Aim normoxia
- PaCO₂ = 4.5 - 5kPa
- Avoid hyperventilation except in refractory ICP rise
- Serum Na⁺ 140 -155mmol/l
 - Can use aliquots of 100ml 5% sodium chloride (can give first dose peripherally thereafter ideally via CVC) or 150ml 2.7% sodium chloride
- Blood sugar 6 -10mmol/l
- Aim normothermia
- Aim for a RASS of -5
- There is insufficient evidence regarding the use of prophylactic anti-epileptics⁴⁻⁶. Start antiepileptics if there is evidence of seizure activity. Suggest levetiracetam 60mg/kg loading dose (up to maximum 4.5g) followed by 1g BD. (There should be a low threshold to request an EEG, if there is concern of subtle motor or non-convulsive seizures).

4.3 Appendix 3

NICE guidelines on contraindications to lumbar puncture⁷

Treat and stabilise any of the following before performing a lumbar puncture:

- unprotected airway
- respiratory compromise
- shock
- uncontrolled seizures
- bleeding risk
- ensure platelets >40; INR ≤1.4; review anticoagulation/antiplatelets

Do not perform lumbar puncture if there is:

- extensive or rapidly spreading purpura
- infection at the lumbar puncture site
- risk factors for an evolving space-occupying lesion*
- any of these symptoms or signs, which might indicate raised intracranial pressure*:
 - new focal neurological features (including seizures or posturing)
 - abnormal pupillary reactions
 - a Glasgow Coma Scale (GCS) score of 9 or less, or a progressive and sustained or rapid fall in level of consciousness.
- Do not perform a lumbar puncture until these factors have been resolved.

*Perform imaging (CT) prior to an LP if the person has evidence of any of these.

5. References

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