Aim/Purpose of this Guideline
Treatment guidelines for clinicians to aid diagnosis, appropriate investigation and treatment for suspected bacterial meningitis or viral encephalitis.

1. The Guidance

1.1. If bacterial meningitis or viral encephalitis is suspected follow guidance:

Viral encephalitis is diagnosed on the clinical signs and symptoms and findings on CSF examination after a lumbar puncture. Symptoms and signs:
- Acute febrile illness with
- New onset seizures
- New focal neurological signs
- With or without meningism (Headache, neck stiffness, photophobia, vomiting)

Associated features:
- Disorientation
- Speech disturbances
- Lethargy
- Drowsiness
- Confusion
- Behavioural changes

Bacterial meningitis is diagnosed on the clinical signs and symptoms and findings on CSF examination after a lumbar puncture.

Symptoms and signs:
- Severe headache
- Neck stiffness
- High fever
- Altered mental status

Associated signs and symptoms:
- Photophobia
- Phonophobia
- Positive Kernig’s or Brudzinki (Involuntary flexion of knee and hip on flexion of neck) sign
- Non-blanching petechial rash points towards meningococcal meningitis/septicaemia

Need to perform CT head before lumbar puncture if any of the following are met:
- Glasgow Coma score < 12 or declining OR
- New onset seizures OR
- Focal neurological signs OR
- Papilloedema OR
- Immunocompromised

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Bacterial infections</th>
<th>Viral infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>May be cloudy</td>
<td>Usually normal</td>
</tr>
<tr>
<td>Opening pressure</td>
<td>May be raised</td>
<td>Usually normal</td>
</tr>
<tr>
<td>Cell count</td>
<td>&gt;1000/mm³</td>
<td>&lt;100/mm³</td>
</tr>
<tr>
<td>Differential</td>
<td>Predominantly polymorphs</td>
<td>Predominantly Lymphocytes</td>
</tr>
<tr>
<td>Protein CSF: Serum Glucose ratio</td>
<td>Mild to moderate elevation &lt;0.4</td>
<td>Normal to mild elevation &gt;0.6</td>
</tr>
</tbody>
</table>

These are guidelines only: Definitive test is microbiology: culture or PCR
Investigations for viral encephalitis and bacterial meningitis

- CT head if indicated
- Blood cultures
- Lumbar puncture STAT or after CT head if indicated
  - CSF for opening pressure
  - Sugar
  - Protein
  - Gram stain if bacteria present
  - Bacterial culture and viral PCR.
- Full blood count, Urea and electrolytes, liver function tests and CRP.
- Throat swabs for meningococcal carriage if bacterial meningitis suspected
- EDTA blood
- Chest X-ray
- If respiratory component check for atypical organisms (e.g. mycoplasma and chlamyphilia pneumoniae)
- HIV test all patients with encephalitis.

Treatment for viral meningitis
Supportive measures:

- Maintain hydration
- Adequate analgesia without too much sedation
- Anticonvulsants if seizures
- Aciclovir 10mg/kg 8 hourly for 14-21 days
- If CT will cause delays of many hours start presumptive treatment with aciclovir whilst awaiting CT and then LP results.
- Initial lumbar puncture may be normal: Consider repeat LP after 24 hrs
- Treat with IV Aciclovir 10mg/kg tds for 14-21 days.
- BMI > 40 use Ideal Body Weight:
  - IBW for men = \((\text{height in cm} - 154) \times 0.9\) + 50
  - IBW for women = \((\text{height in cm} - 154) \times 0.9\) + 45.5

Duration of antivirals:
- Treat for 2-3 weeks if Herpes simplex virus (HSV) proven by viral PCR
- Stop earlier if definitive alternative diagnosis or viral encephalitis seems unlikely based on clinical, imaging and CSF findings
- Repeat CSF at 2-3 weeks, if PCR still positive, continue aciclovir treatment.
- Repeat LP every week until PCR.

Treatment for bacterial meningitis
Supportive measures:

- Maintain hydration
- Adequate analgesia without too much sedation
- Ceftriaxone 2g IV 12 hourly.
- If CT will cause delays of many hours start presumptive treatment with antibiotics whilst awaiting CT and then LP results.
- All IV antibiotic therapy should be reviewed at the end of 48 hours by the clinical team and an antibiotic management plan should be made based on available Microbiology results and clinical condition of the patient.
- Administer steroids (Dexamethasone 0.15mg/kg QDS for 4 days with or just before the first dose of antibiotics) for suspected pneumococcal meningitis
- Take blood cultures, throat swabs, EDTA blood and CSF prior to antibiotic treatment if possible
- Notify PHE and Microbiologist of any suspected case of meningitis or meningococcal sepsis
- Chemoprophylaxis for contacts if meningococcal meningitis is confirmed as per PHE guidance (see below).
### Choice of antibiotics for bacterial meningitis:

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>Likely organisms</th>
<th>First line therapy</th>
<th>Second line treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community acquired male and nonpregnant female 18-50 years</td>
<td>N. Meningitidis, S. Pneumoniae</td>
<td>Ceftriaxone IV 2g 12 hourly</td>
<td>If history of penicillin anaphylaxis Chloramphenicol IV 25mg/kg 6 hourly</td>
</tr>
<tr>
<td>Community acquired pregnant female and patients over 50 yrs.</td>
<td>S. Pneumoniae, Listeria, N. Meningitidis</td>
<td>Ceftriaxone IV 2g 12 hourly and consider adding in Amoxicillin IV 2g 4hourly to cover Listeria in presence of known risk factors: older adults, pregnant women, newborn, immunosuppression.</td>
<td>If penicillin allergic Meropenem IV 2g 8 hourly If severe penicillin allergy d/w Microbiology</td>
</tr>
<tr>
<td>Meningitis healthcare-associated or post-surgical/CNS Shunt infection</td>
<td>D/W Microbiologists</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Further considerations for bacterial meningitis

**Duration of antibiotics:**
- N. Meningitidis- 7 days
- H. influenzae- 7 days
- S. pneumoniae- 10-14 days
- S. agalactiae- 14-21 days
- Aerobic GNB – 21 days
- Listeria monocytogenes- 21 days or more

**Prophylaxis for meningococcal meningitis:**
- Usually required for close household contacts or those exposed to respiratory secretions.
- Inform medical microbiologist and Consultant in Communicable Disease Control (CDCC) as soon as the diagnosis is made.
- Information needed to be conveyed: age, occupation, whether at school, name of close contacts, and any other features requiring community follow up.
- The CDCC will co-ordinate the prophylaxis and immunisation of contacts.
- If Ceftriaxone not administered to index case a suitable agent to eradicate throat carriage must be administered.
- Ciprofloxacin recommended for use in all groups and in pregnancy
2. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>It is a guideline only for medical staff in secondary care without broad experience in the care of patients with suspected bacterial meningitis or viral encephalitis compliance will be monitored through outcome of patients with this condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Dr Gareth Smith</td>
</tr>
<tr>
<td>Tool</td>
<td>Audit</td>
</tr>
<tr>
<td>Frequency</td>
<td>Annually</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>Neurology meeting</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>The Neurology team will change the guidance as necessary in keeping with national and international guidelines.</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>changes necessary will be disseminated through changes in practice in the department.</td>
</tr>
</tbody>
</table>

3. Equality and Diversity

3.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Diversity & Human Rights Policy' or the Equality and Diversity website.

3.2. Equality Impact Assessment
The Initial Equality Impact Assessment Screening Form is at Appendix 2.
## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Clinical guideline for suspected bacterial meningitis or viral encephalitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>18&lt;sup&gt;th&lt;/sup&gt; March 2016</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; April 2016</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; April 2019</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Dr Gareth Smith,</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 253450</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>Contents provide guidance on the symptoms/signs, associated features, investigations and treatment for viral encephalitis and bacterial meningitis.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>CNS, viral encephalitis and bacterial meningitis</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director – Rob Parry</td>
</tr>
<tr>
<td>Date revised:</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; April 2016</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>New document</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Medicine and ED Governance Board</td>
</tr>
<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Name: Sheena Wallace</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>Not required</td>
</tr>
<tr>
<td>Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings</td>
<td>Name: Jon Stratton</td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>Signature:</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on Policies – Approvals and Ratification):</td>
<td>Internet &amp; Intranet</td>
</tr>
</tbody>
</table>
Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/4/16</td>
<td>1</td>
<td>New document</td>
<td>Dr Gareth Smith</td>
</tr>
</tbody>
</table>

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This document is to be retained for 10 years from the date of expiry.
This document is only valid on the day of printing

Controlled Document

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Appendix 2. Initial Equality Impact Assessment Form

<table>
<thead>
<tr>
<th>Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as policy) (Provide brief description):</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate and service area:</td>
<td>New policy</td>
</tr>
<tr>
<td>Name of individual completing assessment: Roz Davies</td>
<td>Telephone: 01872 253244</td>
</tr>
</tbody>
</table>

1. Policy Aim*
Who is the strategy / policy / proposal / service function aimed at?
Medical staff seeking guidance

2. Policy Objectives*
Treatment guidelines for clinicians to aid diagnosis, appropriate investigation and treatment for suspected bacterial meningitis or viral encephalitis.

3. Policy – intended Outcomes*
Safer clinical practice

4. *How will you measure the outcome?
See paragraph 4

5. Who is intended to benefit from the policy?
Neurological patients

6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?
No

6b) If yes, have these *groups been consulted?

C). Please list any groups who have been consulted about this procedure.

7. The Impact
Please complete the following table.

<table>
<thead>
<tr>
<th>Equality Strands:</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (male, female, transgender / gender reassignment)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race / Ethnic communities / groups</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability - Learning disability, physical disability, sensory impairment and mental health problems</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marriage and civil partnership</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:

- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended.  Yes  No  ✓

9. If you are not recommending a Full Impact assessment please explain why.

Signature of policy developer / lead manager / director

| Names and signatures of members carrying out the Screening Assessment | 1. Dr Gareth Smith  
2. Roz Davies | Consultant Neurologist Service Lead |

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed _______________

Date _______________