



GUIDELINE	
<b>Meningitis and Meningoencephalitis</b>	
<b>Scope (Staff):</b>	Clinical Staff – Medical, Nursing, Pharmacy
<b>Scope (Area):</b>	Perth Children’s Hospital (PCH)

**This document should be read in conjunction with this [DISCLAIMER](#)**

- Empirical regimens are intended for initial therapy (up to 48 hours only), therapy should be modified as soon as additional information (source of infection, Gram stain results, culture and susceptibility testing) is available.

CLINICAL SCENARIO	Usual duration	DRUGS/DOSES			
		Standard Protocol	Known or Suspected MRSA <sup>a</sup>	Low risk Penicillin allergy <sup>b</sup>	High risk Penicillin allergy <sup>b</sup>
Meningitis / meningoencephalitis < 1 month of age (community acquired)	See below	IV cefotaxime <b>AND</b> IV benzylpenicillin <b>AND</b> IV aciclovir (doses as per <a href="#">neonatal guidelines</a> )	Discuss with ID or Microbiology Service		
		<ul style="list-style-type: none"> <li>• Discuss all cases with ID/microbiology</li> <li>• Send CSF for cell count, protein, glucose, culture and viral PCR (HSV, enterovirus, parechovirus)</li> <li>• In addition consider blood culture, EDTA blood for HSV PCR, enterovirus/parechovirus swabs (throat, and rectal) and HSV swabs (throat, rectal, eye, umbilical)</li> <li>• For further information refer to <a href="#">ASID perinatal guidelines</a></li> </ul>			

CLINICAL SCENARIO	Usual duration	DRUGS/DOSES			
		Standard Protocol	Known or Suspected MRSA <sup>a</sup>	Low risk Penicillin allergy <sup>b</sup>	High risk Penicillin allergy <sup>b</sup>
Meningitis ≥ 1 month of age (community acquired)		Give IV dexamethasone before or with the first dose of antibiotics as per <a href="#">local guidelines</a> Consider the need to also cover for <a href="#">HSV encephalitis</a> (see below).			
	See below	IV <a href="#">ceftriaxone</a> 50mg/kg/dose (to a maximum of 2 grams) 12 hourly <b>ADD</b> IV <a href="#">vancomycin</a> <sup>c</sup> 15mg/kg/dose (to a maximum initial dose of 750mg) 6 hourly via slow infusion if: i.) Gram-positive cocci are seen on Gram stain; <b>OR</b> ii.) the patient has known or suspected otitis media or sinusitis; <b>OR</b> iii.) has been recently treated with a penicillin, cephalosporin or carbapenem antibiotic <b>OR</b> iv.) is too unwell to undergo a lumbar puncture	As per standard protocol		IV <a href="#">moxifloxacin</a> <sup>d</sup>
	Once the organism has been identified and the results of susceptibility testing are available choose the appropriate directed regimen and duration: <i>N. meningitidis</i> 5-7 days                                   Group B strep 14-21 days <i>S. pneumoniae</i> 10-14 days                                 Gram negative bacilli 21 days <i>H. influenzae</i> 7-10 days                                    Listeria 21 days  No pathogen identified – Discuss with ID or Microbiology Service  For confirmed <i>N. meningitidis</i> , <i>H. influenzae</i> or <i>S. pyogenes</i> meningitis, consider the need for post exposure prophylaxis for contacts as per the <a href="#">ChAMP Medical prophylaxis</a> guideline.				

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Encephalitis ≥ 1 month of age	14-21 days if HSV confirmed	<p><i>If bacterial meningitis or sepsis has <b>not</b> been excluded, in addition to encephalitis treatment, start antibiotics as per <a href="#">Meningitis</a> recommendations above.</i></p> <p style="text-align: center;">IV <a href="#">aciclovir</a>                      Term to &lt;12 years: 20mg/kg/dose (to a maximum of 750mg) 8 hourly;                      ≥ 12 years old: 10mg/kg/dose (to a maximum of 750mg) 8 hourly</p> <p style="text-align: center;"><b>ADD</b></p> <p>Oral <a href="#">oseltamivir</a> 3mg/kg/dose (to a maximum of 75mg) twice daily for five days during flu season (July to September inclusive) and where there is clinical concern. Information regarding influenza activity can be found on <a href="#">Virus Watch</a></p>			
		<p><b>Major criteria (required):</b></p> <ul style="list-style-type: none"> <li>Decreased or altered level of consciousness or lethargy or personality change lasting &gt;24 hours</li> </ul> <p><b>Minor criteria (2 for possible; &gt;3 for probable/confirmed encephalitis):</b></p> <ul style="list-style-type: none"> <li>Documented fever (&gt;38°C) within 72 hours before or after presentation.</li> <li>Generalised or partial seizures not fully attributable to a pre-existing seizure disorder.</li> <li>New onset of focal neurological findings.</li> <li>CSF WBC count &gt;5/mm<sup>3</sup>.</li> <li>New abnormality of brain parenchyma on neuro-imaging suggestive of encephalitis.</li> <li>Abnormality on EEG that is consistent with encephalitis.</li> </ul>			
		<p>Herpes simplex encephalitis can usually be excluded and empirical therapy stopped based on negative CSF nucleic acid amplification tests (e.g. polymerase chain reaction [PCR]) and a normal MRI. However, tests for herpes simplex virus in CSF can be negative in very early disease (before day 3 of illness); consider a repeat lumbar puncture and PCR if clinical suspicion is high.</p> <p>If concerns for HSV encephalitis persist despite a negative PCR please discuss with ID Clinical microbiology.</p>			

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Suspected or proven nosocomial or post-neurosurgical meningitis (including shunt meningitis)	At least 14 days after last positive culture	IV <a href="#">cefepime</a> 50mg/kg/dose (to a maximum of 2 grams) 8 hourly  <b>AND</b> IV <a href="#">vancomycin</a> 15mg/kg/dose (to a maximum initial dose of 750mg) 6 hourly via slow infusion.	As per standard protocol		Discuss with ID or Microbiology Service
Meningitis/ meningoencephalitis in an immunocompromised child	varies	Discuss with ID or Microbiology service			

- a) Children known or suspected to be colonised with MRSA may need to have their therapy/prophylaxis modified. Children suspected of having MRSA include:
- i) Children previously colonised with MRSA
  - ii) Household contacts of MRSA colonised individuals
  - iii) In children who reside in regions with higher MRSA rates (e.g. Kimberley and the Pilbara) a lower threshold for suspected MRSA should be given
  - iv) Children with recurrent skin infections or those unresponsive to  $\geq 48$  of beta-lactam therapy. For further advice, discuss with Microbiology or ID service
- b) Refer to the [ChAMP Beta-lactam Allergy Guideline](#):
- Low risk allergy: a delayed rash (>1hr after initial exposure) without mucosal or systemic involvement (without respiratory distress and/or cardiovascular compromise).
  - High risk allergy: an immediate rash (<1hr after exposure); anaphylaxis; severe cutaneous adverse reaction {e.g. Drug Rash with Eosinophilia and Systemic Symptoms (DRESS) and Stevens – Johnson syndrome (SJS) / Toxic Epidermal Necrolysis (TEN)} or other severe systemic reaction.
- c) IV [vancomycin](#) **15mg/kg/dose** (maximum initial dose 750mg) 6 hourly via slow infusion. Therapeutic drug monitoring required.
- d) IV [moxifloxacin](#) **10mg/kg/dose** (to a maximum of 400mg) given once daily. Moxifloxacin is a red/restricted agent and requires ChAMP approval prior to prescribing.

<b>Related internal policies, procedures and guidelines</b>
<a href="#">Antimicrobial Stewardship Policy</a> (PCH Website)
<a href="#">ChAMP Empiric Guidelines</a>


## References

Antibiotic Writing Group (2020). eTG complete. West Melbourne, Therapeutic Guidelines Ltd.

McMullen BJ, et al. (2016). "Antibiotic duration and timing of the switch from intravenous to oral route for bacterial infections in children: systematic review and guidelines." Lancet Infect Dis **16**: e139-152.

Britton P, et al. Consensus guidelines for the investigation of encephalitis in adults and children in Australia and New Zealand. Internal Medicine Journal. 2015;45:563-76.

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File Path:	<a href="W:\Safety &amp; Quality\CAHS\CLOVERS MEDICAL Pharmacy\Procedures Protocols and Guidelines\ChAMP\Word\Empiric Guidelines\PCH Templated (ED Guidelines)">W:\Safety &amp; Quality\CAHS\CLOVERS MEDICAL Pharmacy\Procedures Protocols and Guidelines\ChAMP\Word\Empiric Guidelines\PCH Templated (ED Guidelines)</a>		
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