STEP-WISE APPROACH FOR TREATING MENINGITIS

A SIMPLIFIED PROTOCOL FOR EFFECTIVE TREATMENT

COMMUNITY ACQUIRED MENINGITIS (CAM)

Refers to acute inflammation of the leptomeninges and subarachnoid space, acquired outside healthcare settings, predominantly caused by bacterial pathogens. CAM presents with a spectrum of symptoms, including fever, headache, neck stiffness (classical triad),altered mental status and photophobia.

HEALTHCARE ASSOCIATED VENTICULITIS & MENINGITIS (HCAVM)

Refers to infections of the meninges or ventricular system that occur as complications of neurosurgical procedures or central nervous system devices, such as external ventricular drains (EVDs), ventriculoperitoneal (VP) shunts, or intracranial pressure monitors. These infections are typically caused by nosocomial pathogens, most commonly coagulase-negative staphylococci, *Staphylococcus aureus* (including MRSA), gram-negative bacilli (e.g., *Pseudomonas, Acinetobacter*) and occasionally fungi. The clinical presentation may be subtle due to sedation or concurrent neurological pathology. Diagnosis often relies on CSF analysis (obtained via the device or LP) & neuroimaging.

MENINGITIS

Ix:-
- Blood Culture
- FBC, CRP
- NCCT brain*
- Lumbar Puncture

*Indications for NCCT brain prior to LP-
- Immunocompromised
- History of CNS disease
- New onset seizures
- Papilledema
- Altered consciousness- GCS ≤12/15
- Focal neurological deficit

Differentiate CAM or HCAVM

Ix:-
- Blood culture
- CSF sample from the device (e.g. :- EVD tap)
- Full Blood Count
- CRP

CAM

Viral Meningitis ← CSF HSV PCR

acyclovir IV 10mg/kg q8h

Bacterial Meningitis

ceftriaxone IV 2g q12h OR
cefotaxime IV 2g q8h
+
dexamethasone IV 8-10 mg q6h for 2-4 days
(Give with the first dose or 15 minutes before the antibiotic/ if dexamethasone is not available don't delay giving antibiotics)

If patient is having following, suspect Listeria Meningitis
- Pregnant women
- History of alcoholism
- Gram positive rods in CSF gram stain
- Signs of brain stem involvement or long tract signs
- Immunocompromised patients (HIV*/ patients on chronic steroid or other immunosuppressive use/ severe neutropenia etc)
- Elderly (>65 years)

Add ampicillin IV 2g q4h

*In HIV patients consider cryptococcal meningitis & send the investigations - Serum or CSF for cryptococcal antigen

If patient is clinically deteriorating / lowering GCS/ presence of new focal neurological signs

Add
vancomycin[A] 15mg/kg q12h
&
repeat imaging ± MRI brain

[A]**vancomycin** should be added when there is high possibility of pneumococcal meningitis in a critically ill patient with poor response to ceftriaxone/ cefotaxime

vancomycin dose should be adjusted according to the **actual body weight** & **eGFR (Table 02)**

If patient is having history of recurrent ear infection / history of mastoiditis

Switch to
ceftazidime IV 2g q8h

HCAVM

Head trauma - Basilar skull fracture → ceftriaxone IV 2g q12h OR cefotaxime IV 2g q8h ± vancomycin 15mg/kg q12h

Penetrating trauma / Post neurosurgery / CSF shunt → vancomycin 15mg/kg q12h ± ceftazidime IV 2g q8h OR meropenem IV 2g q8h

CSF culture & MIC **(Table 01)** and/or CSF multiplex PCR to decide on targeted antibiotics

Table 01

	Microorganism, susceptibility	Standard therapy	Duration (Days)
CAM	• If no pathogen is isolated	ceftriaxone	minimum 10
CAM	• *Streptococcus pneumoniae* Penicillin MIC <0.1 mcg/mL 0.1–1.0 mcg/mL >2.0 mg/mL Cefotaxime or ceftriaxone MIC > 1.0 mg/mL	 penicillin G or ampicillin ceftriaxone or cefotaxime (perform sensitivity) vancomycin plus cefotaxime or ceftriaxone vancomycin plus ceftriaxone or cefotaxime	10 to 14
CAM	• *Neisseria meningitidis* Penicillin MIC <0.1 mcg/mL 0.1–1.0 mcg/mL	 penicillin G or ampicillin ceftriaxone or cefotaxime	07
CAM	• *Haemophilus influenzae* *beta-Lactamase* negative *beta-Lactamase* positive	 ampicillin ceftriaxone or cefotaxime	07 to 10
CAM	• *Listeria monocytogenes* • *Streptococcus agalactiae*	ampicillin or penicillin G ampicillin or penicillin G	≥21 14 to 21
HCAVM	• *Staphylococcus epidermidis*	vancomycin	14 to 28
HCAVM	• *Staphylococcus aureus* Methicillin susceptible Methicillin resistant	 flucloxacillin vancomycin	14 to 28
HCAVM	• *Escherichia coli and other Enterobacteriaceae*[g]	cefotaxime or ceftriaxone	21
HCAVM	• *Pseudomonas aeruginosa*	ceftazidime	
HCAVM	• *Enterococcus species* Ampicillin susceptible Ampicillin resistant Ampicillin and vancomycin resistant	 ampicillin plus gentamicin vancomycin plus gentamicin linezolid	

Table 02

Weight Bands	eGFR (ml/min/1.73m²) Over 90	60-89	45-59	30-44	20-29	Less than 20
More than 100	2g Twice daily	1.5g Twice daily	1g Twice daily	750mg Twice daily	1g Once daily	Seek microbiology /nephrology opinion
86-100	1.5g Twice daily	1.25g Twice daily	1.5g Once daily	1.25g Once daily	750mg Once daily	
65-85	1.25g Twice daily	1g Twice daily	1.25g Once daily	1g Once daily	750mg Once daily	
50-64	1g Twice daily	750mg Twice daily	1g Once daily	750mg Once daily	500mg Once daily	
49-35	750mg Twice daily	500mg Twice daily	750mg Once daily	500mg Once daily	500mg Once daily	

When to start initial maintenance dose after the loading dose?

eGFR (ml/min/1.73m²) Over 90	60-89	45-59	30-44	20-29	Less than 20
12 hours	12 hours	12 hours	24 hours	24 hours	Seek microbiology / nephrology opinion

When to take initial maintenance dose after the loading dose?

Blood for vancomycin levels should be taken immediately before the dose is due (trough level).

In patients with eGFR of 20ml/min/1.73m² or more, give the dose- do not wait for the level. Check the result before the next dose is given, and adjust dose if appropriate.

In patients with eGFR less tha 20ml/min/1.73m² see below.

Twice daily doses	Take blood sample before the 4th **maintenance** dose is given
Once daily doses	Take blood sample before the 2nd **maintenance** dose is given

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This protocol doesn't account for dosing in renal failure, pregnancy & antibiotic allergy.

Updated in 2025

References -
- Sri Lanka College of Microbiologists. Empirical and prophylactic use of antimicrobials: national guidelines 2024 [Internet]. Colombo: SLCM; 2024 [cited 2025 Jun 24]. Available from: https://slmicrobiology.lk/empirical-and-prophylactic-use-of-antimicrobials-national-guidelines-sri-lanka-2024/
- Tunkel AR, van de Beek D, Scheld WM, et al. Practice guidelines for the management of bacterial meningitis [Internet]. Arlington (VA): Infectious Diseases Society of America (IDSA); 2004 [cited 2025 Jun 24]. Available from: https://www.idsociety.org/practice-guideline/bacterial-meningitis/

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