S T A N D A R D O P E R A T I N G P R O C E D U R E

Pyogenic (Bacterial) Meningitis

Diagnosis and Management

Special Region (1)

Union of Myanmar

Version 1.0

Effective Date: 11th November 2025

Review Date: 11th November 2027

Approved by: Internal Medicine

1. Purpose

To provide a standardized protocol for early recognition, diagnosis, and treatment of pyogenic meningitis to reduce mortality and complications.

2. Definition

Acute bacterial infection of the meninges with CSF pleocytosis, elevated protein, and low glucose.

3. Common Organisms

- Adults: *S. pneumoniae*, *N. meningitidis*
- Elderly: *Listeria*, Gram-negative bacilli

4. Clinical Features

- Fever, neck stiffness, altered mental status, headache, vomiting, photophobia, seizures, focal deficits
- Non-blanching rash means meningococcal septicemia until proven otherwise. In meningococcal septicemia, shock and DIC are the common complications and it causes high mortality.

5. Initial Management

- ABC stabilization
- Do not delay antibiotics
- Take blood cultures if possible

6. Indications for CT before LP

- GCS < 11
- Focal neurological deficit
- Papilledema
- New seizures
- Immunocompromised

7. CSF Findings

- In pyogenic meningitis: High opening pressure, neutrophilic pleocytosis, high protein, low glucose
- CSF GeneXpert for TB meningitis

8. Antibiotics

8.1 Empirical Antibiotic Treatment

Age	Antibiotic	Dosage
18-50 yr	Ceftriaxone/cefotaxime	Ceftriaxone 2 g IV 12 hourly or cefotaxime 2 g 4-6 hourly
18-50 yr	Ceftriaxone/cefotaxime + vancomycin (resistant pneumococcal)	Ceftriaxone 2 g IV 12 hourly, cefotaxime 2 g 4-6 hourly, vancomycin 15-20 mg/kg 8-12 hourly
18-50 yr	Moxifloxacin + vancomycin (if beta-lactam allergy)	400 mg daily
> 50 yr	Ceftriaxone/cefotaxime + ampicillin	Ceftriaxone/cefotaxime - same as above, ampicillin 2 g IV 4 hourly
> 50 yr	Ceftriaxone/cefotaxime + ampicillin + vancomycin (resistant pneumococcal)	Same as above
> 50 yr	Moxifloxacin + vancomycin + co-trimoxazole (if beta-lactam allergy)	Moxifloxacin and vancomycin - same as above, co-trimoxazole - trimethoprim 5 mg/kg IV 6-8 hourly

Duration of empirical antibiotic(s) is 10-14 days if microscopic and culture investigation are not available.

8.2 Definitive (Confirmed) Antibiotic(s) Therapy

Organism	First-line Antibiotic	Dose (Adult)	Alternative	Duration	Key Notes
S. pneumoniae (sensitive)	Ceftriaxone	2 g IV q12h	Penicillin G	10-14 days	De-escalate if sensitive
S. pneumoniae (resistant)	Ceftriaxone + vancomycin	2 g IV q12h + 15-20 mg/kg q8-12h	Linezolid (rare)	10-14 days	Continue combo if high MIC
Neisseria meningitidis	Ceftriaxone	2 g IV q12h	Penicillin G	5-7 days	Shortest duration
Haemophilus influenzae	Ceftriaxone	2 g IV q12h	Cefotaxime	7-10 days	Consider de-escalation

Listeria monocytogenes	Ampicillin	2 g IV q4h	TMP-SMX	≥ 21 days	± Gentamicin first 5-7 days
Gram-negative bacilli	Cefepime / ceftazidime	High dose IV	Meropenem	14-21 days	Tailor to sensitivity
E. coli / Enterobacter	Ceftriaxone	2 g IV q12h	Cefepime	14-21 days	Check ESBL risk
Pseudomonas aeruginosa	Ceftazidime / cefepime	High dose IV	Meropenem	14-21 days	Always anti-pseudomonal
Staphylococcus aureus (MSSA)	Flucloxacillin	2 g IV q4-6h	Cefazolin	10-14 days	Post-neurosurgery common
Staphylococcus aureus (MRSA)	Vancomycin	15-20 mg/kg q8-12h	Linezolid	14-21 days	Monitor levels
Coagulase-negative *Staph*	Vancomycin	15-20 mg/kg q8-12h	Linezolid	10-14 days	Often device-related

9. Adjunctive Therapy

- Dexamethasone 0.15 mg/kg IV q6h for 2-4 days. Give dexamethasone BEFORE or WITH the FIRST dose of antibiotics and may be effective up to 1 hour. But dexamethasone is not effective after 1 hour of first dose of antibiotic(s) because massive cytokines respond has already spread.

Dexamethasone plays differing roles in pyogenic and tuberculous meningitis. In **pyogenic meningitis**, it is administered early (before or with antibiotics) to reduce acute inflammatory responses following bacterial lysis, thereby decreasing neurological complications such as cerebral edema and hearing loss. Mortality benefit is mainly observed in pneumococcal meningitis.

- Seizure control
- Manage raised ICP

10. Monitoring

GCS, vitals, electrolytes, renal function

11. Complications

- Cerebral edema
- Hydrocephalus
- Seizures
- Hearing loss

12. Chemoprophylaxis

Only meningococcus and *Haemophilus influenzae* type b meningitis need prophylaxis.

For meningococcal meningitis, give prophylaxis to:

- Household contacts
- Dormitory roommates
- Intimate contacts (kissing)
- Childcare contacts
- Healthcare workers with unprotected exposure to respiratory secretions

For *Haemophilus influenzae* type b meningitis, give prophylaxis if household has child < 5 years, OR immunocompromised contact present.

Dosage of Chemoprophylaxis

- Oral rifampicin 600 mg BD 2 days, or
- Oral ciprofloxacin 500 mg stat, or
- IM ceftriaxone 250 mg stat (for pregnancy)

13. References

1. WHO. Meningitis guidelines. 2023.
2. Tunkel AR et al. *Clin Infect Dis.* 2017.
3. van de Beek D et al. *NEJM.* 2016.
4. CDC. 2024.