EMPIRIC TREAMENT OF CENTRAL NERVOUS SYSTEM INFECTIONS

Clinical Setting	Likely Pathogens	Empiric Therapy[a]	Usual Duration
Bacterial meningitis Community-acquired	*S. pneumoniae*, *N. meningitidis*, *H. influenzae* type b, *L. monocytogenes*[b]	First line: ceftriaxone + vancomycin ± ampicillin[b,c] Alternatives: moxifloxacin + vancomycin ± ampicillin[b,c]	*H. influenzae* & *N. meningitidis*[e]: 7 days *S. pneumoniae*[e]: 10-14 days *L. monocytogenes*[e]: at least 21 days
		Consider adjunctive dexamethasone[d] (for ≤ 2-4 days) in the following scenarios: » Children >6 weeks with suspected or proven *H. influenzae* type b meningitis » Adults with suspected or proven *S. pneumoniae* meningitis	
Bacterial meningitis Hospital-acquired (post-neurosurgical, CSF shunt) *Recommend formal ID consultation for additional management*	Aerobic gram-negative bacilli (including *P. aeruginosa*), *S. aureus* (including MRSA), coagulase-negative staphylococci, *Propionibacterium acnes*	**If CSF shunt present, all infected components should be removed.** First line[f]: cefepime + vancomycin Alternatives[f]: Meropenem + vancomycin[g]	10-14 days *If shunt present, duration of therapy and reimplantation of shunt likely dependent on pathogen and sterilization of CSF cultures*
Brain abscess	Streptococci, anaerobes, *S. aureus* (including MRSA)	First line: ceftriaxone + metronidazole ± vancomycin Alternatives: Meropenem ± vancomycin Moxifloxacin + metronidazole ± vancomycin Aztreonam + metronidazole + vancomycin	4-8 weeks *Duration dependent upon response (radiographic and clinical), receipt of surgery, pathogen, and abscesses characteristics (number of lesions, initial size, location)*
Viral encephalitis Immunocompetent hosts	Herpes simplex virus, varicella-zoster virus	IV acyclovir	14-21 days
	Other viruses	Supportive care *Antiviral therapy not recommended*	Not applicable
Viral encephalitis Immunocompromised hosts Consider empiric coverage for the following depending on clinical scenario *Recommend formal ID consultation for additional management*	Herpes simplex virus, varicella-zoster virus	IV acyclovir	14-21 days
	Cytomegalovirus	IV ganciclovir + foscarnet	21 days, then maintenance therapy
	Human herpesvirus 6	IV ganciclovir or foscarnet	21 days[e]
	HIV	HAART therapy	Indefinitely
	Other viruses (including West Nile virus, Epstein-Barr virus, JC virus)	Supportive care *Antiviral therapy not recommended*	Not applicable
Viral meningitis	Enteroviruses, arboviruses	Supportive care *Antiviral therapy not recommended*	Not applicable
Fungal meningitis Consider empiric coverage for the following depending on clinical scenario *Recommend formal ID consultation for additional management*	*Candida* species	Liposomal amphotericin B ± flucytosine, followed by fluconazole	**Recommend formal ID consultation to determine duration of therapy**
	Cryptococcus species	Induction: liposomal amphotericin B + flucytosine Consolidation: fluconazole	
	Coccidioides species	First line: fluconazole Alternative: itraconazole	
	Blastomyces species, *Histoplasma capsulatum*	Liposomal amphotericin B followed by itraconazole	
	Aspergillus species	Voriconazole or liposomal amphotericin B	

[a] Antibiotic therapy should be tailored based on susceptibility results
[b] Consider coverage for *Listeria monocytogenes* if any of the following: neonates (<1 month old), age >50 years, pregnancy, liver disease, alcoholism, malignancy, and defects in cell-mediated immunity (e.g. glucocorticoids, transplantation).
[c] For severe penicillin allergies, consider TMP-SMX for coverage for *Listeria monocytogenes*.
[d] Adjunctive dexamethasone therapy should be initiated before or with the first dose of antibiotics. Adjunctive dexamethasone should not be given to patients who have already received antibiotics as this is not likely to improve outcomes.
[e] No strong evidence for durations of therapy. Duration of therapy may need to be individualized based on clinical response.
[f] Consider intrathecal or intraventricular antimicrobial therapy if poor response to systemic antimicrobial therapy alone
[g] Consider ciprofloxacin or aztreonam as an alternative if severe penicillin allergy (e.g. anaphylaxis)

References

1. Tunkel AR, Hartman BJ, Kaplan SL, et al. Practice guidelines for the management of bacterial meningitis. Clin Infect Dis 2004; 39: 1267-84.
2. Tunkel AR, Hasbun R, Bhimraj A, et al. 2017 Infectious Diseases Society of America's clinical practice guideline for healthcare-associated ventriculitis and meningitis. Clin Infect Dis 2017; 64: e34-e65.
3. Tunkel AR, Glaser CA, Bloch KC, et al. The management of encephalitis: clinical practice guidelines by the Infectious Diseases Society of America. Clin Infect Dis 2008; 47: 303-27.