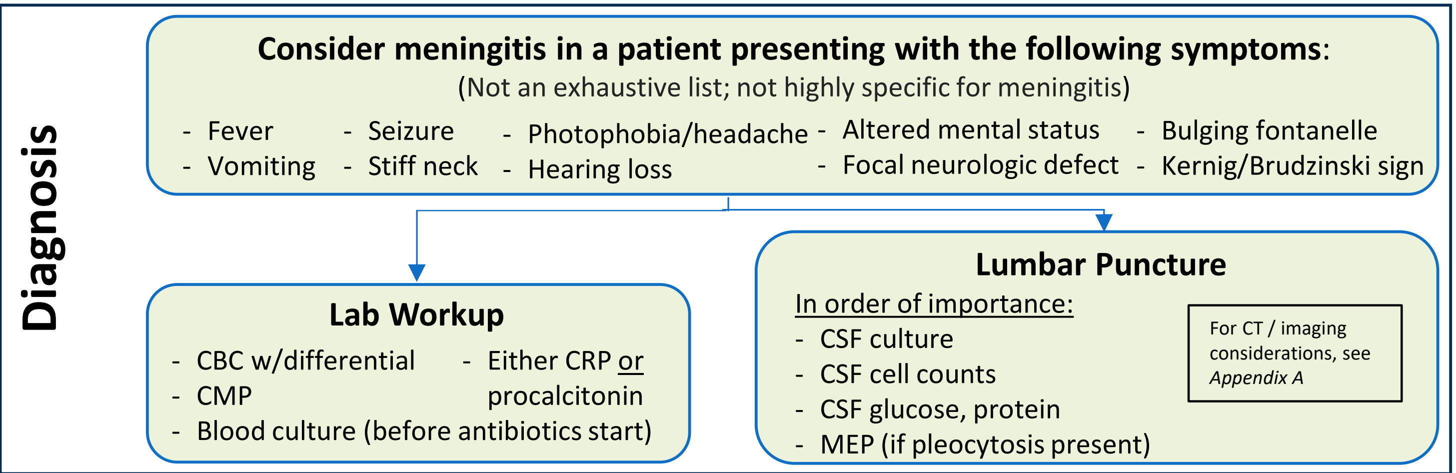
Suspected Community-Acquired Meningitis Clinical Practice Guideline

"Community acquired" is suspected when patient presents from the outpatient setting and does not meet exclusion criteria.

Inclusion criteria: Children (≥60 days and ≤ 18 years) suspected of having bacterial meningitis in the ED or admitted to one of the inpatient units at MCJCHV in the previous 2 days.

Exclusion criteria: Patients with symptom onset > 2 days after hospitalization, immunocompromised status, recent head trauma or neurosurgery, known CSF leak or brain abscesses, ventriculoperitoneal (VP) shunts or other neurologic hardware, and NICU patients.



Management

Ongoing clinical suspicion for meningitis-- LP performed, labs sent.

- High suspicion **OR** unable to obtain CSF → **Start antimicrobials**
- Low suspicion (see *Appendix B* for criteria) → **Await results of CSF studies** (Interpretation of CSF on page 2)
  - CSF **is** consistent with bacterial meningitis → **Start antimicrobials**
  - CSF is **not** consistent with bacterial meningitis → **Consider alternative diagnoses (see *Appendix C*)**

Antibiotics

- **Ceftriaxone**
  50 mg/kg Q12H
  (max 2000 mg/dose)
- **Vancomycin**
  use order panel

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- If CSF fluid appears purulent or cloudy, start dexamethasone
- See *Appendix D* for allergies & considerations for HSV

Follow up on CSF studies. Is *bacterial* meningitis still the primary diagnosis based on CSF WBC, differential, glucose, & protein? (CSF interpretation on page 2)

- No → Consider alternative diagnoses (see *Appendix C*)
- Yes → Start **dexamethasone** 0.15 mg/kg Q6H (max 10 mg/dose) for 2-4 days
  Steroids should *ideally* be given prior to or with the first dose of antibiotics, but they can be given up to 12H later. If after 12H, please discuss risk/benefits with peds ID.

Consult **peds ID** & **audiology**.

Consider consulting **peds ENT** if associated mastoiditis.

Consider consulting **peds neurology** if focal abnormal neuro exam or seizure-like activity.

Follow up MEP & CSF culture

- Any organism other than *S.pneumo* or *H.flu* identified on MEP **OR** MEP is negative → **Stop** steroids & vancomycin
- *Haemophilus influenzae* → **Stop** Vancomycin → Continue steroids for 2-4 days
- *Streptococcus pneumoniae* → Continue steroids for 2-4 days

Continue steroids for 2-4 days
Patient may require repeat LP if not clinically improving while on antibiotics and steroids

Before Discharge:

- Refer patient to audiology for ongoing outpatient audiologic monitoring.
- Consider need for outpatient parenteral antibiotic therapy (OPAT).
- Consider need for outpatient neurology, ENT, or ID follow up.
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Appendix A: Imaging considerations

- CT with contrast may be indicated to rule out obvious signs of a mass, abscess, edema, or increased intracranial pressure, if not contraindicated.
- Consider CT or MRI imaging if patient has focal neurologic deficits, reduced or fluctuating level of consciousness, somnolence out of proportion to exam findings, shock or coagulopathy, seizure in the preceding 7 days, or immunocompromised status.
- Many patients with bacterial meningitis should undergo a CT or MRI brain during the acute phase of their illness to identify nascent ventriculitis, ependymitis, abscesses, and possibly the primary source of infection (e.g., mastoiditis, sinusitis).

Appendix B: Symptoms making bacterial meningitis less likely:

- Prolonged, mild symptoms
- Clinical improvement without antibiotics
- Probable alternative diagnosis

Appendix C: Alternative diagnoses to consider

- HSV encephalitis
- Tickborne encephalitis
- Intracranial abscess
- Viral meningitis
- Tuberculosis meningitis
- Aseptic meningitis
- Para-infectious syndromes
- Neuroimmunologic syndromes (ADEM, MOG-associated encephalitis)

Appendix D: Antibiotics and steroids

- If allergic (high suspicion for serious reaction) to ceftriaxone and <5 years old, prescribe **levofloxacin 10 mg/kg IV Q12H** (max 375 mg/dose)
- If allergic (high suspicion for serious reaction) to ceftriaxone and $\geq$5 years old, prescribe **levofloxacin 10 mg/kg IV Q24H** (max 750 mg/dose)
- Vancomycin is part of empirical therapy because of the possibility of resistant *S. pneumoniae*. It should be stopped if there is no CSF pleocytosis (<7 WBCs) or if an organism other than *S. pneumoniae* is identified, even if susceptibilities are pending.
- Consider using **acyclovir 10-15 mg/kg Q8H** if medically indicated
    - HSV should be considered in patients with vesicles, seizures, hypothermia, mucous membrane ulcers, CSF pleocytosis in the absence of a positive gram stain, leukopenia, thrombocytopenia, or elevated alanine aminotransferase levels.
- Steroids have been shown to decrease morbidity (including hearing loss) in adults and children with *H.influenzae* meningitis and in adults with *S. pneumoniae* meningitis.

Interpreting CSF studies:

- Consider history (exposures, previous antibiotics), physical exam, and labs to determine likelihood of bacterial meningitis.
- CSF suggestive of bacterial meningitis:
  Purulent or cloudy CSF
  Opening pressure >25 mg H_2O
  Positive gram stain
  Pleocytosis, especially if >50% neutrophils
- Remember, patients <90 days old can have bacterial meningitis without pleocytosis.
- Pediatric infectious diseases team is available to help interpret traumatic taps, as needed.

CSF studies			
Etiology	**WBC**/mm³	**Glucose** (mg/dL)	**Protein** (mg/dL)
Healthy	0-7 cells	~0.6x serum	5-40 mg/dL
Bacterial	↑ to ↑↑↑ (>80% N)	<40	>100
Viral	↑ (L/M)	Normal	<100
TB	↑ (L)	<40	>200
Tickborne disease	↑ to ↑↑↑ (L)	Normal	<100
Aseptic (IVIG, TMP-SMX)	↑	Normal	Normal
KD	Normal or ↑	Normal	Normal

(N) Neutrophil predominance; (L) Lymphocyte predominance (M) Monocyte predominance; (TMP-SMX) Trimethoprim-Sulfamethoxazole; (KD) Kawasaki Disease

Chart adapted from The Harriet Lane handbook, 2023 and Principles & Practice of Pediatric Infectious Diseases, 2018