

An 8-month-old boy is brought to the emergency department with fever, vomiting, and increased sleepiness. He has had a fever for 3 days despite taking acetaminophen and ibuprofen. Over the past day, he has become increasingly sleepy with significantly decreased oral intake. The boy is up to date on all immunizations. His temperature is 40 C (104 F), blood pressure is 92/48 mm Hg, pulse is 120/min, and respirations are 30/min. Pulse oximetry shows 96% on room air. The anterior fontanelle is soft and full. The infant is fussy and cries when attempts are made to flex his head. Pupils are equal, round, and reactive to light. There are no focal neurologic deficits. Complete blood count and blood culture are pending. Which of the following are the most appropriate next steps in the management of this patient?

- ☐ A. Head CT scan followed by lumbar puncture
- ☐ B. Intravenous antibiotics followed by head CT scan
- ☐ C. Intravenous antibiotics followed by lumbar puncture
- ☐ D. Lumbar puncture followed by head CT scan
- ☐ E. Lumbar puncture followed by intravenous antibiotics

An 8-month-old boy is brought to the emergency department with fever, vomiting, and increased sleepiness. He has had a fever for 3 days despite taking acetaminophen and ibuprofen. Over the past day, he has become increasingly sleepy with significantly decreased oral intake. The boy is up to date on all immunizations. His temperature is 40 C (104 F), blood pressure is 92/48 mm Hg, pulse is 120/min, and respirations are 30/min. Pulse oximetry shows 96% on room air. The anterior fontanelle is soft and full. The infant is fussy and cries when attempts are made to flex his head. Pupils are equal, round, and reactive to light. There are no focal neurologic deficits. Complete blood count and blood culture are pending. Which of the following are the most appropriate next steps in the management of this patient?

- ☐ A. Head CT scan followed by lumbar puncture [12%]
- ☐ B. Intravenous antibiotics followed by head CT scan [8%]
- ☐ C. Intravenous antibiotics followed by lumbar puncture [20%]
- ☐ D. Lumbar puncture followed by head CT scan [1%]
- ☒ E. Lumbar puncture followed by intravenous antibiotics [59%]

[Proceed to Next Item](#)


Explanation:

User Id:

Bacterial meningitis in children age >1 month	
Clinical features	<ul style="list-style-type: none">• Fever• Vomiting/poor feeding• Seizures• Altered mental status (eg, lethargy, irritability)• Nuchal rigidity, Kernig & Brudzinski signs• Bulging anterior fontanelle
Workup	<ul style="list-style-type: none">• CBC & electrolytes• Blood cultures• LP & CSF studies
Indications for imaging	<ul style="list-style-type: none">• History of hydrocephalus or neurosurgical procedure• History of head trauma

[Proceed to Next Item](#)

Explanation:

User Id: 

Bacterial meningitis in children age >1 month	
Clinical features	<ul style="list-style-type: none">• Fever• Vomiting/poor feeding• Seizures• Altered mental status (eg, lethargy, irritability)• Nuchal rigidity, Kernig & Brudzinski signs• Bulging anterior fontanelle
Workup	<ul style="list-style-type: none">• CBC & electrolytes• Blood cultures• LP & CSF studies
Indications for imaging prior to LP	<ul style="list-style-type: none">• History of hydrocephalus or neurosurgical procedure• History of head trauma• Coma or focal neurologic findings
Treatment	<ul style="list-style-type: none">• Intravenous vancomycin & ceftriaxone OR cefotaxime• Dexamethasone for <i>Haemophilus influenzae</i> type b meningitis

CBC= complete blood count; CSF= cerebrospinal fluid; LP = lumbar puncture.

©UWorld

This infant's clinical presentation (**altered mental status, lethargy, fever, nuchal rigidity**, vomiting) is concerning for bacterial meningitis. *Streptococcus pneumoniae* and *Neisseria meningitidis* are the most common causes of bacterial meningitis in children age >1 month.

Management requires **cerebrospinal fluid (CSF)** analysis to establish the diagnosis and identify the offending pathogen; this should be followed by prompt administration of empiric **antibiotics**. Antibiotic administration before lumbar puncture (**Choice C**) should be avoided whenever possible as antibiotics can sterilize CSF and make definitive diagnosis difficult. However, infants who are critically ill (eg, status epilepticus, hypotension) or who cannot receive lumbar puncture immediately should receive

CBC= complete blood count; CSF= cerebrospinal fluid; LP = lumbar puncture.

©UWorld

This infant's clinical presentation (**altered mental status, lethargy, fever, nuchal rigidity**, vomiting) is concerning for bacterial meningitis. *Streptococcus pneumoniae* and *Neisseria meningitidis* are the most common causes of bacterial meningitis in children age >1 month.

Management requires **cerebrospinal fluid (CSF)** analysis to establish the diagnosis and identify the offending pathogen; this should be followed by prompt administration of empiric **antibiotics**. Antibiotic administration before lumbar puncture (**Choice C**) should be avoided whenever possible as antibiotics can sterilize CSF and make definitive diagnosis difficult. However, infants who are critically ill (eg, status epilepticus, hypotension) or who cannot receive lumbar puncture immediately should receive antibiotics first.

This patient is awake and has normal heart rate and blood pressure. Therefore, the lumbar puncture should be performed immediately; antibiotics can be administered afterward. Third-generation cephalosporins (eg, **ceftriaxone** or **cefotaxime**) are effective against most strains of *S pneumoniae* and *N meningitidis*; **vancomycin** is given due to increasing prevalence of resistant strains of *S pneumoniae*. In neonates (age ≤28 days), cefotaxime should be used as ceftriaxone displaces bilirubin from albumin and increases the risk of kernicterus. This risk does not exist in older infants who are unlikely to have hyperbilirubinemia. Finally, dexamethasone can reduce the risk of sensorineural hearing loss, particularly when *Haemophilus influenzae* type b is the causative organism.

(**Choices A, B, and D**) CSF analysis and administration of antibiotics are the priorities when meningitis is suspected. Herniation is extremely rare in infants as their fontanelles are open and can accommodate some brain swelling. Therefore, head CT imaging should be reserved for patients who are comatose, have focal neurologic findings, or a history of neurosurgical procedure (ie, ventriculoperitoneal shunt, as shown in the table). In the absence of such findings, a head CT scan will only delay appropriate testing and treatment.

Educational objective:

Bacterial meningitis in infants presents with lethargy, fever, poor oral intake, and vomiting. Urgent lumbar puncture should be performed before providing antibiotics in most cases. Infants who are critically ill (eg, status epilepticus, septic shock) may require antibiotics before lumbar puncture. Head CT imaging should be reserved for comatose infants, those with focal neurologic findings, or a history of neurosurgical procedure.

References:

Identify the offending pathogen, this should be followed by prompt administration of empiric **antibiotics**. Antibiotic administration before lumbar puncture (**Choice C**) should be avoided whenever possible as antibiotics can sterilize CSF and make definitive diagnosis difficult. However, infants who are critically ill (eg, status epilepticus, hypotension) or who cannot receive lumbar puncture immediately should receive antibiotics first.

This patient is awake and has normal heart rate and blood pressure. Therefore, the lumbar puncture should be performed immediately; antibiotics can be administered afterward. Third-generation cephalosporins (eg, **ceftriaxone** or **cefotaxime**) are effective against most strains of *S pneumoniae* and *N meningitidis*; **vancomycin** is given due to increasing prevalence of resistant strains of *S pneumoniae*. In neonates (age ≤ 28 days), cefotaxime should be used as ceftriaxone displaces bilirubin from albumin and increases the risk of kernicterus. This risk does not exist in older infants who are unlikely to have hyperbilirubinemia. Finally, dexamethasone can reduce the risk of sensorineural hearing loss, particularly when *Haemophilus influenzae* type b is the causative organism.

(Choices A, B, and D) CSF analysis and administration of antibiotics are the priorities when meningitis is suspected. Herniation is extremely rare in infants as their fontanelles are open and can accommodate some brain swelling. Therefore, head CT imaging should be reserved for patients who are comatose, have focal neurologic findings, or a history of neurosurgical procedure (ie, ventriculoperitoneal shunt, as shown in the table). In the absence of such findings, a head CT scan will only delay appropriate testing and treatment.

Educational objective:

Bacterial meningitis in infants presents with lethargy, fever, poor oral intake, and vomiting. Urgent lumbar puncture should be performed before providing antibiotics in most cases. Infants who are critically ill (eg, status epilepticus, septic shock) may require antibiotics before lumbar puncture. Head CT imaging should be reserved for comatose infants, those with focal neurologic findings, or a history of neurosurgical procedure.

References:

1. **Clinical features suggestive of meningitis in children: a systematic review of prospective data.**
2. **Bacterial meningitis in the United States, 1998-2007.**
3. **Acute bacterial meningitis in infants and children: epidemiology and management.**