Bacterial meningitis in adults
van de Beek, D.

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ADDRESS
Diederik van de Beek
Department of Neurology
Academic Medical Center
University of Amsterdam
P.O. Box 22700
1100 DE Amsterdam
The Netherlands
Telephone +31 20 566 3842
Fax +31 20 697 1438
E-mail d.vandebeek@amc.uva.nl
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**Bacterial Meningitis in Adults**

**Contra-indications for performing lumbar puncture**

- Signs of brain shift
- Papilledema
- Focal neurologic deficits, not including cranial nerve palsy
- Glasgow Coma Scale score below 10
- Septic shock (diastolic blood pressure below 60 mmHg)
- Coagulopathy
- Coagulant-use
- Disseminated intravascular coagulation
- Serious skin infection at site lumbar puncture

**Recommendations for empiric antimicrobial therapy in The Netherlands**

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 16-60 years</td>
<td>Penicillin</td>
</tr>
<tr>
<td>Age &gt;60 years</td>
<td>Amoxicillin and third-generation cephalosporin</td>
</tr>
<tr>
<td>With risk factor present* and age &gt;16 years</td>
<td>Amoxicillin and third-generation cephalosporin</td>
</tr>
<tr>
<td>Recent neurosurgery and age &gt;16 years</td>
<td>Vancomycin and third-generation cephalosporin</td>
</tr>
</tbody>
</table>

* Alcohol abuse, altered immune status, diabetes mellitus, recent head injury, cerebrospinal fluid leak

**Recommendation for adjunctive corticosteroid therapy**

<table>
<thead>
<tr>
<th>Corticosteroid</th>
<th>Dose</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone</td>
<td>10 mg 4 times daily</td>
<td>4 days</td>
</tr>
</tbody>
</table>

* Start before or with the first dose of antibiotic

**Recommendations for antimicrobial therapy**

<table>
<thead>
<tr>
<th>Type of Bacteria</th>
<th>Choice of antibiotic</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td>Penicillin</td>
</tr>
<tr>
<td>Penicillin-susceptible</td>
<td>Third-generation cephalosporin</td>
</tr>
<tr>
<td>Intermediate-penicillin-susceptible</td>
<td>Vancomycin and third-generation cephalosporin</td>
</tr>
<tr>
<td>Penicillin-resistant</td>
<td></td>
</tr>
<tr>
<td><em>Neisseria meningitidis</em></td>
<td>Penicillin</td>
</tr>
<tr>
<td>Penicillin-susceptible</td>
<td>Third-generation cephalosporin</td>
</tr>
<tr>
<td>Penicillin-resistant</td>
<td>Amoxicillin and aminoglycoside</td>
</tr>
<tr>
<td><em>Listeria monocytogenes</em></td>
<td>Penicillin</td>
</tr>
<tr>
<td>Penicillin-susceptible</td>
<td>Third-generation cephalosporin</td>
</tr>
<tr>
<td>Penicillin-resistant</td>
<td>Amoxicillin</td>
</tr>
<tr>
<td><em>Haemophilus influenzae</em></td>
<td>Penicillin</td>
</tr>
<tr>
<td>β-lactamase negative</td>
<td>Amoxicillin</td>
</tr>
<tr>
<td>β-lactamase positive</td>
<td>Third-generation cephalosporin</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em></td>
<td>Penicillin</td>
</tr>
<tr>
<td>Meticillin-sensitive</td>
<td>Flucloxacillin</td>
</tr>
<tr>
<td>Meticillin-resistant</td>
<td>Vancomycin and rifampicin</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>Penicillin</td>
</tr>
<tr>
<td>Amoxicillin-sensitive</td>
<td>Third-generation cephalosporin</td>
</tr>
<tr>
<td>Amoxicillin-resistant</td>
<td></td>
</tr>
</tbody>
</table>

* The preferred dose: penicillin, 2 million units every 4 hours; amoxicillin, 2 g every 4 hours; third-generation cephalosporin: ceftriaxone, 2 g every 12 hours, or cefotaxime, 2 g every 4 hours, vancomycin, 1 g every 8 hours, aminoglycoside: gentamicin 4 mg per kg bodyweight daily; flucloxacillin, 2 g every 4 hours; rifampicin 600 mg every 12 hours.

Department of Neurology, Academic Medical Center
Amsterdam, telephone +31-20-5669111
D. van de Beek (tracer 58653), J. de Gans (tracer 62289), 2004
Suspicion for community-acquired bacterial meningitis
Typical signs may be absent, prior antibiotics may mask severity of illness

Assess severity:
- Ventilation
- Circulation
- Neurologic examination

Start investigations:
- Blood cultures
- Blood gases
- Serum laboratory
- Rash: skin biopsy

Shock (diastolic blood pressure < 60 mmHg) and/or coagulopathy (coagulant-use or disseminated intravascular coagulation)?

YES

Contra-indications lumbar puncture?
- Papilledema
- Focal neurologic deficits, not including cranial nerve palsy
- Glasgow Coma Scale score < 10

Empiric antimicrobial therapy
- Shock: no dexamethasone
- Coagulopathy without shock: dexamethasone 10 mg

Stabilization and/or correction coagulopathy

NO

Contra-indications lumbar puncture?
- Papilledema
- Focal neurologic deficits, not including cranial nerve palsy
- Glasgow Coma Scale score < 10

Dexamethasone 10 mg and empiric antimicrobial therapy

Lumbar puncture

Cloudy CSF or apparent progress of disease?

YES

CT scan brain

Space-occupying lesion causing significant brain-shift?

YES

CSF consistent with bacterial meningitis?

NO

No lumbar puncture

Bacterial meningitis:
- Dexamethasone 10 mg and empiric antimicrobial therapy

Reconsider diagnosis