GENERAL INFORMATIONS

IMPORTANT CONSIDERATIONS

- Most cases of AOM clear up without antibiotics.
- Most of AOM-related complications (mastoiditis, etc.) occur in a pneumococcal otitis context and in children < 2 years of age.
- Risk factors of Streptococcus pneumoniae resistance:
  - Daycare attendance
  - Children < 2 years of age
  - Recent hospital stay
  - Recent antibiotic treatment (< 30 days)
  - Frequent AOM

Bacterial pathogens most frequently found in AOM

- Streptococcus pneumoniae
- Non-typeable Haemophilus influenzae
- Moraxella catarrhalis
- Streptococcus pyogenes

PREVENTIVE MEASURES

- Breastfeeding exclusively until child is at least 6 months of age
- Living in a smoke-free environment
- Practising nasal hygiene adapted to the child’s age
- Following the recommended vaccination schedule under the Québec Immunisation Program

DIAGNOSIS

Clinical diagnosis is based on patient history and on a methodical assessment of the tympanic membrane position, colour/transparency and mobility.

Diagnosis of AOM is marked by:

- Recent, usually abrupt, onset of signs and symptoms
- The presence of the following two features:
  - Mucopurulent effusion in the middle ear indicated by at least one of the following:
    - Bulging of the tympanic membrane OR
    - Tympanic membrane coloured and opaque OR
    - Otorrhea not due to an external otitis OR
    - Mobility of the tympanic membrane absent or limited
  - Middle-ear inflammation as indicated by at least one of the following:
    - Marked erythema of the tympanic membrane OR
    - Otalgia (evidence of pain in the ear that interferes with normal activities or sleep)
When making a diagnosis of AOM, it is important to systematically search for complications: Central nervous system changes, facial paralysis, retroauricular swelling

**CAUTION:**
Serous or mucoid otitis (effusion without inflammation with or without retraction of the tympanic membrane) does not require antibiotic therapy.

### TREATMENT PRINCIPLES

**Conditions that require urgent consultation with a specialist to consider an invasive medical workup and treatment:**
- Infant under three months of age with temperature ≥ 38°C
- Suspicion of meningitis or mastoiditis
- Toxicity or impairment of general condition

### SUPPORTIVE TREATMENTS

- It is important to reduce pain and fever by using an analgesic/antipyretic (acetaminophen or ibuprofen*), especially in the first few days.
- Neither decongestants nor antihistamines have proven useful in treating AOM in children.

*Ibuprofen is not recommended for children under 6 months of age.

### CRITERIA FOR INITIAL TREATMENT OR OBSERVATION OF CHILD

<table>
<thead>
<tr>
<th>AGE</th>
<th>SEVERE SYMPTOMS (moderate to severe otalgia for over 48 hours or temperature ≥ 39°C or perforation of the tympanic membrane)</th>
<th>MILD SYMPTOMS (mild otalgia for less than 48 hours and temperature &lt; 39°C and no perforation of the tympanic membrane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 6 months</td>
<td>Antibiotic treatment</td>
<td>Antibiotic treatment</td>
</tr>
<tr>
<td>6 months to 2 years</td>
<td>Antibiotic treatment</td>
<td>Close observation OR Antibiotic treatment*</td>
</tr>
<tr>
<td>&gt; 2 years</td>
<td>Antibiotic treatment</td>
<td>Close observation OR Antibiotic treatment</td>
</tr>
</tbody>
</table>

Φ The American Academy of Pediatrics (AAP) recommends antibiotic treatment for cases of bilateral otitis in children under 2 years of age. Although, the Canadian Paediatric Society (CPS), does not distinguish between unilateral or bilateral AOM.

**Close observation** consists of delaying antibiotic treatment for 48 hours:

- **Appropriate if:**
  - The prescriber deems it appropriate.
  - Antibiotic treatment can be started when symptoms persist or worsen.
  - There is collaboration with parents (shared decision).

- **Not appropriate for children:**
  - Under 6 months of age
  - With immunodeficiency, chronic cardiac or pulmonary disease, or head or neck abnormalities
  - With severe symptoms
HISTORY OF ALLERGIC REACTION TO A PENICILLIN ANTIBIOTIC

- True penicillin allergy is uncommon. For 100 children with a history of penicillin allergy fewer than 6 will be **confirmed** to have a true diagnosis of allergy and the reactions will be mostly delayed non-severe rashes.
  - It is therefore important to carefully assess the allergy status of a patient who reports a history of allergic reaction to penicillin, before considering using alternatives to beta-lactams. For help, consult the decision-making tool in case of allergy to penicillins.

ANTIBIOTIC TREATMENT

The first-line antibiotic treatment for AOM is high-dose (90 mg/kg/day) amoxicillin:
- Helps achieve therapeutic concentrations in the middle ear for the treatment of pneumococci intermediate resistant to penicillin and of most highly penicillin-resistant pneumococci
- Generally well tolerated by children

However, in children who present no risk factors for resistance, amoxicillin 45 mg/kg/day, TID, can be considered.

### FIRST-LINE ANTIBIOTIC THERAPY FOR ACUTE OTITIS MEDIA

(This recommendation remains appropriate even if the child has had prior episodes of AOM.)

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Daily dosage</th>
<th>Maximum dosage</th>
<th>Treatment duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amoxicillin</strong></td>
<td>90 mg/kg/day PO ÷ BID</td>
<td>2 000 mg PO BID</td>
<td>10 days</td>
</tr>
<tr>
<td><strong>Amoxicillin-clavulanate</strong> (7:1 formulation) or <strong>Amoxicillin + Amoxicillin-clavulanate</strong> (7:1 formulation)</td>
<td>90 mg/kg/day PO ÷ BID or 45 mg/kg/day PO ÷ BID</td>
<td>1 500 mg PO BID or 750 mg PO BID</td>
<td>10 days</td>
</tr>
<tr>
<td><strong>Ceftriaxone</strong></td>
<td>50 mg/kg/day, intramuscular (IM) or intravenous (IV)</td>
<td>1 000 mg/dose</td>
<td>1 to 3 days</td>
</tr>
</tbody>
</table>

**EXTREME CASES**

If there is severe vomiting or nothing can be taken orally:
- Ceftriaxone 50 mg/kg/day, intramuscular (IM) or intravenous (IV) 1 000 mg/dose 1 to 3 days

If history of allergic reaction to a penicillin antibiotic:
- **Click here** to view the acute otitis media algorithm for help in choosing an antibiotic therapy

1. The 7:1 formulation (BID) of amoxicillin-clavulanate is preferred due to its higher digestive tolerance. The 200 mg/5 ml and 400 mg/5 ml formulations and 875 mg tablets contain the correct ratio of amoxicillin and clavulanic acid. Some clinicians use a combination of amoxicillin (45 mg/kg/day) and amoxicillin-clavulanate (7:1 formulation) (45 mg/kg/day) to reduce adverse effects (total of 90 mg/kg/day, 14:1 equivalent); volumes of amoxicillin and amoxicillin-clavulanate to be given could be different.

2. Severe symptoms: Moderate to severe otalgia for over 48 hours, or temperature ≥ 39°C or perforation of the tympanic membrane.

If there is no response after 48 to 72 hours of treatment and before starting second-line treatment:
- Verify acceptability and compliance with treatment
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<tr>
<td><strong>Amoxicillin-clavulanate</strong>&lt;sup&gt;1&lt;/sup&gt; (7:1 formulation)</td>
<td>90 mg/kg/day PO ÷ BID or 45 mg/kg/day PO ÷ BID or 45 mg/kg/day PO ÷ BID</td>
<td>1 500 mg PO BID or 750 mg PO BID or 750 mg PO BID</td>
<td>10 days 10 days</td>
</tr>
<tr>
<td><strong>Ceftriaxone</strong></td>
<td>50 mg/kg/day, IM or IV</td>
<td>1 000 mg/dose</td>
<td>3 days 3 days</td>
</tr>
</tbody>
</table>

1. The 7:1 formulation (BID) of amoxicillin-clavulanate is preferred due to its higher digestive tolerance. The 200 mg/5 ml and 400 mg/5 ml formulations and 875 mg tablets contain the correct ratio of amoxicillin and clavulanic acid. Some clinicians use a combination of amoxicillin (45 mg/kg/day) and amoxicillin-clavulanate (7:1 formulation) (45 mg/kg/day) to reduce adverse effects (total of 90 mg/kg/day, 14:1 equivalent); volumes of amoxicillin and amoxicillin-clavulanate to be given could be different.

**Note**: Treatment of mild AOM with otorrhea in a child with ventilation tubes consists of applying antibiotic ciprofloxacin drops, with or without corticosteroid, into the external auditory canal, twice daily, for a period including 2 days without discharge.

**CRITERIA FOR REFERRAL TO OTORHINOLARYNGOLOGY (ORL)**

- AOM that is resistant to second-line antibiotic treatments
- More than 4 episodes of AOM in 6 months or 6 episodes per year
- Perforation of the tympanic membrane that is not resolved after 6 weeks

**MAIN REFERENCES**


Please note that other references have been consulted.
ACUTE OTITIS MEDIA (AOM) IN CHILDREN

SEVERITY OF PREVIOUS ALLERGIC REACTION TO PENICILLIN ANTIBIOTICS

Vague history
- Unconvincing history reported by patient or family

Non-severe reaction
- Immediate reaction¹
  - Isolated cutaneous involvement
    (urticaria and/or angioedema)

- Delayed reaction²³
  - Isolated cutaneous involvement
    (Rash and/or urticaria and/or angioedema)

Severe reaction
- Immediate reaction
  - Anaphylaxis⁴

- Delayed reaction
  - Severe skin reaction
    (desquamation, pustules, vesicles, purpura with fever or joint pain, but no DRESS, SJS/TEN, or AGEP)
  - Serum sickness³

Very severe reaction
- Immediate reaction
  - Anaphylactic shock
    (with or without intubation)

- Delayed reaction
  - Hemolytic anemia
  - Renal involvement
  - Hepatic involvement
  - DRESS, SJS/TEN, AGEP

Penicillin allergy CONFIRMED⁵
- (severe or non-severe reaction only)

THE FOLLOWING CAN BE PRESCRIBED SAFELY

- DISSIMILAR cephalosporins
  - Cefuroxime axetil⁶ or Ceftriaxone⁷

- SIMILAR cephalosporins
  - Cefprozil
    - if history of allergy does not suggest an immediate reaction...

- If in doubt about the possibility of an immediate reaction...
  - a 1-hour observation period after the administration of the 1st dose of Cefprozil under the supervision of a health professional could be advised according to the clinician judgment.

- PRESCRIBE THE FOLLOWING WITH CAUTION

- DISSIMILAR cephalosporins
  - Cefuroxime axetil⁶ or Ceftriaxone⁷

- SIMILAR cephalosporins
  - Cefprozil
    - only if serum sickness-like reactions occurred in childhood³.

  - The 1st dose should always be administered under medical supervision.

  - If history of:
    - Immediate reactions, a drug provocation test should be performed;
    - Delayed reactions, the patient or his/her family should be informed of the possible risk of recurrence in the days following initiation of the antibiotic.

PRESCRIBE THE FOLLOWING WITH CAUTION

- Penicillins
  - Amoxicillin +/- Clavulanate
    - The 1st dose should always be administered under medical supervision.

    - If history of:
      - Immediate reactions, a drug provocation test should be performed;
      - Delayed reactions, the patient or his/her family should be informed of the possible risk of recurrence in the days following initiation of the antibiotic.

AVOID PRESCRIBING

- Beta-lactams⁸
  - Choose another class of antibiotics.

PRESCRIBE THE FOLLOWING

- Clarithromycin or Azithromycin

- For further information, see the interactive tool and the decision-making tool.

IF A BETA-LACTAM⁹ CANNOT BE ADMINISTERED, THE FOLLOWING CAN BE PRESCRIBED...

- Clarithromycin OR Azithromycin

AGEP: acute generalized exanthematous pustulosis;
DRESS: drug reaction with eosinophilia and systemic symptoms;
SJS: Stevens–Johnson syndrome;
TEN: toxic epidermal necrolysis.
# Acute Otitis Media (AOM) in Children

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Daily dosage</th>
<th>Maximum dosage</th>
<th>Treatment duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta-lactams, recommended, according to the clinical judgement support algorithm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefuroxime axetil</td>
<td>30 mg/kg/day PO ÷ BID</td>
<td>500 mg PO BID</td>
<td>10 days</td>
</tr>
<tr>
<td>Cefprozil</td>
<td></td>
<td></td>
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<td>Ceftriaxone</td>
<td>50 mg/kg/day, IM or IV</td>
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<td>90 mg/kg/day PO ÷ BID</td>
<td>2 000 mg PO BID</td>
<td></td>
</tr>
<tr>
<td>Amoxicillin/Clavulanate (7:1 formulation)</td>
<td>90 mg/kg/day PO ÷ BID</td>
<td>1 500 mg PO BID</td>
<td>10 days</td>
</tr>
<tr>
<td>OR Amoxicillin + Amoxicillin-Clavulanate (7:1 formulation)</td>
<td>45 mg/kg/day PO ÷ BID + 45 mg/kg/day PO ÷ BID</td>
<td>750 mg PO BID + 750 mg PO BID</td>
<td>10 days</td>
</tr>
<tr>
<td><strong>Alternative if a beta-lactam cannot be administered</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarithromycin</td>
<td>15 mg/kg/day PO ÷ BID</td>
<td>500 mg PO BID</td>
<td>10 days</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>10 mg/kg PO daily on day 1, then 5 mg/kg PO daily x 4 days</td>
<td>500 mg PO daily on day 1, then 250 mg PO daily x 4 days</td>
<td>5 days</td>
</tr>
</tbody>
</table>

1. Cefuroxime axetil as an oral suspension is not widely used due to its unpleasant taste. See the product monograph to learn how to improve the taste of this medication.
2. Exceptional cases; if severe vomiting or if oral administration is not possible. Should be diluted with lidocaine 1% without epinephrine.
3. The 7:1 formulation (BID) of amoxicillin-clavulanate is preferred due to its higher digestive tolerance. The 200 mg/5 ml and 400 mg/5 ml formulations and 875 mg tablets contain the correct ratio of amoxicillin and clavulanic acid. Some clinicians use a combination of amoxicillin (45 mg/kg/day) and amoxicillin-clavulanate (7:1 formulation) (45 mg/kg/day) to reduce adverse effects (total of 90 mg/kg/day, 14:1 equivalent); volumes of amoxicillin and amoxicillin-clavulanate to be given could be different.
4. Severe symptoms: Moderate to severe otalgia for over 48 hours, or temperature ≥ 39°C or perforation of the tympanic membrane.
5. Penicillins, cephalosporins and carbapenems.

*If the cautious administration of a penicillin is the option chosen, opt for amoxicillin/clavulanate instead of amoxicillin alone if either of the following applies: antibiotics used in the past 30 days or the child has not been vaccinated against *Haemophilus influenzae* type b.*