GENERAL INFORMATIONS

IMPORTANT CONSIDERATIONS

- Most of Rhinosinusitis cases are viral and resolve spontaneously.
- Children contract 6 upper respiratory tract infections (URTIs) per year, on average, and they last from 7 to 10 days, but can persist to 14 days.
- Approximately 5% of URTIs develop into acute bacterial rhinosinusitis.
- Antibiotic treatment should be given only for acute bacterial rhinosinusitis.

- Risk factors of *Streptococcus pneumoniae* resistance:
  - Daycare attendance
  - Children < 2 years of age
  - Recent hospitalization
  - Recent antibiotic treatment (< 30 days)

Bacterial pathogens most frequently associated with acute bacterial rhinosinusitis

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

PREVENTIVE MEASURES

- Living in a smoke-free environment
- Practising daily nasal hygiene – increase frequency when suffering from URTIs
- Following the recommended vaccination schedule under the Québec Immunisation Program

DIAGNOSIS

Bacterial rhinosinusitis symptoms overlap with those of viral rhinosinusitis.

Diagnosis is based on one of the following three clinical situations:

- Persisting symptoms for 10 to 14 days without improvement:
  - Purulent rhinorrhea OR
  - Daytime cough that may increase at night

- Symptoms worsening after 5 to 7 days following initial improvement (biphasic infection):
  - Purulent rhinorrhea OR
  - Persistent daytime cough OR
  - Temperature ≥ 38°C

- Severe symptoms for at least 3 days in a row:
  - Temperature ≥ 39°C AND
  - Purulent rhinorrhea

If there is significant impairment of the general condition, edema / peri-orbital redness or impairment of the central nervous system, complications must be considered (urgent consultation in hospital).
RADIOGRAPHY

- Sparsely useful:
  - To distinguish viral infections from bacterial infections in children
  - In cases of rhinosinusitis without complications
- If X-ray is used, thickening of the mucosa alone is not a criterion of acute rhinosinusitis.

TREATMENT PRINCIPLES

SUPPORTIVE TREATMENTS

- Pain and fever can be treated with an analgesic/antipyretic (acetaminophen or ibuprofen*) within the first few days.
- A nasal saline solution used for irrigation helps relieve symptoms.
- Topical corticosteroid use is generally not recommended but can have a modest effect on rhinosinusitis symptoms.
- Neither decongestants nor antihistamines have proven useful in treating acute rhinosinusitis in children.

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

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 THERAPY

The first-line antibiotic treatment for rhinosinusitis is high-dose (90 mg/kg/day) amoxicillin:

- Helps achieve therapeutic concentrations in the sinuses for the treatment of pneumococci intermediately 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, three times daily, can be considered.
Optimal treatment duration has not been determined in pediatrics: experts recommend 10 to 14 days of antibiotic treatment, including at least 5 days after symptoms resolution.

### FIRST-LINE ANTIBIOTIC TREATMENT FOR ACUTE BACTERIAL RHINOSINUSITIS

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Daily dosage</th>
<th>Maximum dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>90 mg/kg/day PO ÷ BID</td>
<td>2 000 mg PO BID</td>
</tr>
<tr>
<td>Amoxicillin-Clavulanate&lt;sup&gt;1&lt;/sup&gt; (7:1 formulation)</td>
<td>90 mg/kg/day PO ÷ BID</td>
<td>1 500 mg PO BID</td>
</tr>
<tr>
<td>Or Amoxicillin + Amoxicillin-Clavulanate&lt;sup&gt;1&lt;/sup&gt; (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>
</tr>
</tbody>
</table>

If antibiotics have been used within the past 30 days:

- Amoxicillin-Clavulanate<sup>1</sup> (7:1 formulation)
  - Or Amoxicillin + Amoxicillin-Clavulanate<sup>1</sup> (7:1 formulation)

If history of allergic reaction to a penicillin antibiotic:

Click [here](#) to view the acute bacterial rhinosinusitis in children algorithm for help in choosing an antibiotic therapy.

In the case where no response is observed after 48 to 72 hours of treatment and before starting second-line treatment:
- Verify acceptability and adherence to treatment.

### SECOND-LINE ANTIBIOTIC TREATMENT FOR ACUTE BACTERIAL RHINOSINUSITIS

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Daily dosage</th>
<th>Maximum dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin-Clavulanate&lt;sup&gt;1&lt;/sup&gt; (7:1 formulation)</td>
<td>90 mg/kg/day PO ÷ BID</td>
<td>1 500 mg PO BID</td>
</tr>
<tr>
<td>Or Amoxicillin + Amoxicillin-Clavulanate&lt;sup&gt;1&lt;/sup&gt; (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>
</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.

### MAIN REFERENCES


Please note that other references have been consulted.
### Severe Reaction

#### Immediate reaction
- Anaphylaxis

#### Delayed reaction
- Severe skin reaction
  - Desquamation, pustules, vesicles, purpura with fever or joint pain, but no DRESS, SJS/TEN, or AGEP
  - Serum sickness

#### Penicillin allergy
- CONFIRMED
  - Severe or non-severe reaction only

### Very Severe Reaction

#### Immediate reaction
- Anaphylactic shock
  - With or without intubation

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

### AVOID PRESCRIBING

**Beta-lactams**
- Choose another class of antibiotics.

**Clarithromycin**

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**Severity of Previous Allergic Reaction to Penicillin Antibiotics**

<table>
<thead>
<tr>
<th>Vague history</th>
<th>Unconvincing history reported by patient or family</th>
<th>Non-severe reaction</th>
<th>Severe reaction</th>
<th>Very severe reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Immediate reaction</td>
<td>Isolated cutaneous involvement (urticaria and/or angioedema)</td>
<td>Immediate reaction</td>
<td>Anaphylaxis</td>
</tr>
<tr>
<td></td>
<td>Delayed reaction</td>
<td>Isolated cutaneous involvement (Rash and/or urticaria and/or angioedema)</td>
<td>Delayed reaction</td>
<td>Severe skin reaction</td>
</tr>
<tr>
<td></td>
<td>Penicillin allergy</td>
<td>CONFIRMED</td>
<td>(severe or non-severe reaction only)</td>
<td>Penicillin allergy</td>
</tr>
</tbody>
</table>

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**The Following Can Be Prescribed Safely**

- **DISSIMILAR cephalosporins**
  - Cefuroxime axetil
- **SIMILAR cephalosporins**
  - Cefprozil

**Prescribe the Following with Caution**

- **DISSIMILAR cephalosporins**
  - Cefuroxime axetil
- **SIMILAR cephalosporins**
  - Cefprozil
  - **Cefprozil ONLY** if serum sickness-like reactions occurred in childhood.

**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**

- **Penicillins**
  - Amoxicillin +/- Clavulanate
  - **SIMILAR cephalosporins**
  - Cefprozil for all other clinical situations (with the exception of children with a history of serum sickness-like reactions, as described above).

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**If a Beta-lactam** cannot be administered, the following can be prescribed...

**Clarithromycin**

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1. Immediate reaction (type I or IgE-mediated): usually occurs within one hour after taking the first dose of an antibiotic.
2. Delayed reaction (types II, III and IV): may occur at any time from one hour after administration of a drug.
3. Delayed skin reactions and serum sickness-like reactions that occur in children on antibiotic therapy are generally non-allergic and may be of viral origin.
4. Anaphylaxis: without shock or intubation; requires an extra level of vigilance.
5. With no recommendations concerning other beta-lactams.
6. Penicillin 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.
7. Penicillins, cephalosporins and carbapenems.

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**Additional Information**

- **AGEP**: acute generalized exanthematous pustulosis
- **DRESS**: drug reaction with eosinophilia and systemic symptoms
- **SJS**: Stevens–Johnson syndrome
- **TEN**: toxic epidermal necrolysis

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For further information, see the interactive tool and the decision-making tool.
# Acute Rhinosinusitis in Children

## First-Line Antibiotic Therapy for Acute Bacterial Rhinosinusitis

**If History of Allergic Reaction to a Penicillin Antibiotic**

<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</strong> recommended, according to the clinical judgement support algorithm</td>
<td></td>
<td></td>
<td>10 to 14 days</td>
</tr>
<tr>
<td>Cefuroxime axetil¹</td>
<td>30 mg/kg/day PO ÷ BID</td>
<td>500 mg PO BID</td>
<td></td>
</tr>
<tr>
<td>Cefprozil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>90 mg/kg/day PO ÷ BID</td>
<td>2 000 mg PO BID</td>
<td></td>
</tr>
<tr>
<td><strong>Amoxicillin/Clavulanate</strong>² (7:1 formulation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR Amoxicillin + Amoxicillin-Clavulanate³ (7:1 formulation)</td>
<td>90 mg/kg/day PO ÷ BID OR 45 mg/kg/day PO ÷ BID + 45 mg/kg/day PO ÷ BID</td>
<td>1 500 mg PO BID OR 750 mg PO BID + 750 mg PO BID</td>
<td></td>
</tr>
<tr>
<td>Alternative if a beta-lactam³ cannot be administered⁴</td>
<td>15 mg/kg/day PO ÷ BID</td>
<td>500 mg PO BID</td>
<td></td>
</tr>
<tr>
<td>Clarithromycin</td>
<td></td>
<td></td>
<td></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. 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.
3. Penicillins, cephalosporins and carbapenems.
4. Azithromycin has no indication for acute bacterial rhinosinusitis.

If the cautious administration of penicillin is the option chosen, opt for amoxicillin/clavulanate instead of amoxicillin alone if the following applies: antibiotics used in the past 30 days.