INTRODUCTION

Sinusitis and rhinosinusitis refer to inflammation in the nasal cavity and paranasal sinuses (figure 1). Acute rhinosinusitis (ARS) lasts less than four weeks. The term "rhinosinusitis" is preferred to "sinusitis" since inflammation of the sinuses rarely occurs without concurrent inflammation of the nasal mucosa.

Distinguishing acute viral rhinosinusitis related to colds and influenza-like illnesses from bacterial infection is a frequent challenge to the primary care clinician.

CLASSIFICATION:

Classification of rhinosinusitis is based upon symptom duration:

- Acute rhinosinusitis – Symptoms for less than four weeks
- Subacute rhinosinusitis – Symptoms for 4 to 12 weeks
- Chronic rhinosinusitis – Symptoms persist greater than 12 weeks
- Recurrent acute rhinosinusitis – Four or more episodes of ARS per year, with interim symptom resolution
Acute Rhinosinusitis

Microbiology

Acute viral rhinosinusitis (AVRS): the vast majority of cases of acute rhinosinusitis (ARS) are due to viral infection. The most common viruses that cause AVRS are rhinovirus, influenza virus, and parainfluenza virus.

Acute bacterial rhinosinusitis (ABRS):
Acute bacterial infection occurs in only 0.5 to 2.0 percent of episodes of ARS. ABRS occurs when bacteria secondarily infect an inflamed sinus cavity. The most common bacteria associated with ABRS are Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis, with the first two comprising approximately 75 percent of cases of ABRS (table 1).

Distribution of pathogens in acute bacterial rhinosinusitis: (table 1)

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus pneumoniae</td>
<td>41</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>35</td>
</tr>
<tr>
<td>Moraxella catarrhalis</td>
<td>4</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>3</td>
</tr>
<tr>
<td>Anaerobes</td>
<td>7</td>
</tr>
<tr>
<td>Streptococcus species</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
</tbody>
</table>
Nasal congestion and obstruction, purulent nasal discharge, maxillary tooth discomfort, and facial pain or pressure that is worse or localized to the sinuses when bending forward.

### Symptoms of ARS

| Nasal congestion and obstruction, purulent nasal discharge, maxillary tooth discomfort, and facial pain or pressure that is worse or localized to the sinuses when bending forward. |

### Diagnosis

**Acute viral rhinosinusitis**

Acute viral rhinosinusitis (AVRS) is diagnosed clinically when patients have <10 days of symptoms consistent with ARS that are not worsening.

**Acute bacterial rhinosinusitis**

We use the following criteria to diagnose ABRS, which are supported by the guidelines from the Infectious Diseases Society of America and the American Academy of Otolaryngology-Head and Neck surgery:

- **Persistent** symptoms or signs of ARS lasting 10 or more days without evidence of clinical improvement **or**
- Onset of **severe** symptoms or signs of high fever (>39°C or 102°F) and purulent nasal discharge or facial pain for at least three to four consecutive days at the beginning of illness **or**
- Symptoms of a typical viral upper respiratory infection that are slowly improving but then worsen again ("double-worsening") with more severe symptoms and signs (new-onset fever, headache, nasal discharge) after five to six days.
1- ACUTE VIRAL RHINOSINUSITIS:

Patients with acute viral rhinosinusitis (AVRS) should be managed with supportive care; there are no treatments to shorten the clinical course of the disease.

Symptomatic therapies:

Symptomatic management of acute rhinosinusitis (ARS), both viral and bacterial in etiology, aims to relieve symptoms of nasal obstruction and rhinorrhea as well as the systemic signs and symptoms such as fever and fatigue.

- **Analgesics and antipyretics** — OTC analgesics and antipyretics such as nonsteroidal anti-inflammatory drugs and acetaminophen (650 mg q4h or 1,000 mg q6h dose for adults) can be used for pain and fever relief as needed.

- **Saline irrigation** — Mechanical irrigation with buffered, physiologic, or hypertonic saline may reduce the need for pain medication and improve overall patient comfort, particularly in patients with frequent sinus infections.

  **The benefits of saline irrigation:**
  1. Saline (saltwater) washes the mucus and irritants from your nose.
  2. The sinus passages are moisturized.
  3. Studies have also shown that a nasal irrigation improves cell function (the cells that move the mucus work better).

  **The instructions:** Irrigate your nose with saline one to two times per day.

- **Others:**
  - **Intranasal glucocorticoids** — Studies have shown small symptomatic benefits and minimal adverse effects with short-term use of intranasal glucocorticoids (budesonide, fluticasone).
  - For patients with both viral and bacterial ARS. Intranasal glucocorticoids are likely to be most beneficial for patients with underlying allergic rhinitis.
**Oral decongestants:** Oral decongestants like pseudoephedrine may be useful when Eustachian tube dysfunction is a factor for patients with AVRS. These patients may benefit from a short course (three to five days) of oral decongestants. In other patients, there is no evidence that oral decongestants are efficacious in decreasing symptoms of ARS, and they have many adverse side effects.

**Intranasal decongestants:** Intranasal decongestants are often used as symptomatic therapies by patients. These agents, such as e.g. phenylephrine, oxymetazoline, tramazoline, xylometazolin, may provide a subjective sense of improved nasal patency. However, there is no evidence to support their use for ARS. If used, topical decongestants should be used sparingly for no more than three consecutive days to avoid rebound congestion, addiction, and mucosal damage associated with long-term use.

**Mucolytics:** Mucolytics such as guaifenesin serve to thin secretions and may promote ease of mucus drainage and clearance.

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**2- ACUTE BACTERIAL RHINOSINUSITIS**

In addition to supportive care, options for the outpatient management of uncomplicated acute bacterial rhinosinusitis (ABRS) are observation or antibiotics depending on patient follow-up (algorithm 1).

**Natural history:** Many patients with ABRS have self-limited disease that resolves without antibiotic therapy.

**Indications for urgent referral:** Urgent early referral is essential for patients with symptoms that are concerning for complicated ABRS or have evidence of complications on imaging.

These include patients with: high, persistent fevers >38.8; periorbital edema, inflammation, or erythema; cranial nerve palsies; abnormal extraocular movements; proptosis (is protrusion of the eyeball); vision changes (double vision or impaired vision); severe headache; altered mental status; or meningeal signs.
**Observation and symptomatic management:** We suggest observation (watchful waiting) with symptomatic management for immunocompetent patients with ABRS who have good follow-up (assurance that antibiotic therapy can be started if the patient does not improve or worsens. We start antibiotic therapy after diagnosis for patients who do not have good follow-up. The symptomatic management of ABRS is similar to that of acute viral rhinosinusitis (AVRS).

**Antibiotics** should be started in:

- Patients who have been managed with observation who have **worsening** symptoms.

- Patients with stable symptoms (no worsening or improvement) after 7 **days** may be managed either with an additional 10 days of observation and symptomatic management or antibiotic therapy, depending on patient presentation, comorbidities, and social factors.

- Patients with worsening symptoms or who fail to improve with an additional 10 days of watchful waiting should be started on antibiotics.

There are also a variety of reasons for patients to have a suppressed immune system, and treatment decisions for immunocompromised patients should be made on a case-by-case basis. They may warrant immediate antibiotic treatment and/or specialist referral.

**Initial oral therapy** — Most patients with ABRS do not have culture data to guide antibiotic therapy, and treatment is initiated empirically ([algorithm 2](#)). The choice of antibiotic is based on the most common bacteria associated with ABRS. As there is limited evidence to guide therapy routine coverage for *Staphylococcus aureus* or methicillin-resistant *S. aureus* (MRSA) is not indicated at this time. Despite the prevalence of staphylococcal colonization in the middle meatus in health adults, *S. aureus* remains an uncommon cause of ABRS.
**Algorithm 1:** Suggested approach to observation versus antimicrobial therapy for outpatient treatment of uncomplicated acute bacterial rhinosinusitis (ABRS) in immunocompetent adults

* Uncomplicated ABRS is ABRS without evidence of extension of infection beyond the paranasal sinuses and nasal cavity into the central nervous system, orbit, or surrounding tissues.
¶ Good follow-up: Assurance that antibiotic therapy can be started if symptoms worsen or if no improvement within 7 days.
Δ Decision will depend on patient presentation, comorbidities, and social factors.
Algorithm 2: Suggested approach to empiric antimicrobial therapy for outpatient treatment of uncomplicated acute bacterial rhinosinusitis (ABRS) in immunocompetent adults

- Patient with uncomplicated ABRS requires antibiotics
  - No penicillin allergy
    - Risk factors for resistance
      - No
        - One of the following:
          - Amoxicillin-clavulanate (standard dose): either
            - 500 mg/125 mg three times daily or
            - 625 mg/125 mg twice daily
          - Amoxicillin-clavulanate (high dose):
            - 2000 mg/125 mg extended-release tablets twice daily
      - Yes
        - Monitor on antibiotic therapy
  - Penicillin allergy
    - One of the following:
      - Doxycycline 100 mg twice daily or 200 mg daily or
      - Levofloxacin 500 mg daily or moxifloxacin 400 mg daily or
      - In patients who can tolerate cephalosporins:
        - Clindamycin 150 mg or 300 mg every 6 hours plus a
          third-generation oral cephalosporin (ceftiraxone 400 mg daily
          or cefpodoxime 200 mg twice daily)

- Monitor on antibiotic therapy
  - Improved symptoms
    - Treat for 5 to 7 days total
  - Symptomatic worsening or no improvement in 7 days
    - Confirm the diagnosis of ABRS
      - Yes
        - Complicated ABRS?
          - No
            - Switch to second-line therapy
            - Improved symptoms
              - Treat for 7 to 10 days total
            - Symptomatic worsening or no improvement in 7 days
              - Refer for imaging/culture
          - Yes
            - Treat complication accordingly
              - Improved symptoms
                - Treat for 7 to 10 days total
              - Symptomatic worsening or no improvement in 7 days
                - Refer for imaging/culture
            - No
              - Complicated ABRS?
                - No
                  - Switch to second-line therapy
                  - Improved symptoms
                    - Treat for 7 to 10 days total
                  - Symptomatic worsening or no improvement in 7 days
                    - Refer for imaging/culture
                - Yes
                  - Treat complication accordingly
                    - Improved symptoms
                      - Treat for 7 to 10 days total
                    - Symptomatic worsening or no improvement in 7 days
                      - Refer for imaging/culture
Δ Risk factors for resistance include:
- Living in geographic regions with rates of penicillin-non susceptible *S. pneumoniae* exceeding 10%
- Age ≥65 years
- Hospitalization in the last 5 days
- Antibiotic use in the previous month
- Immunocompromised
- Multiple comorbidities (eg, diabetes or chronic cardiac, hepatic, or renal disease)
- Severe infection (eg, evidence of systemic toxicity with temperature of ≥102°F, threat of supportive complications)

◊ The diagnosis of ABRS can be confirmed clinically. In patients in whom there are concerns for complications, imaging should be obtained. In other patients in whom symptoms are not completely consistent with ABRS, imaging is reasonable to rule out sinusitis and/or evaluation for alternative diagnosis.

¥ Choice of second-line agent will depend on initial therapy.

For patients not allergic to penicillin, options include:
- Amoxicillin-clavulanate 2000 mg/125 extended-release tablets mg orally twice daily
- Levofloxacin 500 mg orally once daily
- Moxifloxacin 400 mg orally once daily

For penicillin-allergic patients options include:
- Doxycycline 100 mg twice daily or 200 mg once daily
- Levofloxacin 500 mg orally once daily
- Moxifloxacin 400 mg orally once daily

Duration:
- Patients who are improving on initial therapy should be treated for a course of 5 to 7 days.
- Shorter courses *(five to seven days)* are reasonable as the available evidence suggests that response rates are similar to longer courses of antibiotics, and longer courses are associated with more adverse events.
Failure of initial and second-line oral therapies

- Patients should respond to second-line therapies within seven days of initiation. Patients who fail both initial and second-line therapies should have imaging and be referred for further evaluation.
  - A non-contrast computed tomography (CT) scan is appropriate in the evaluation of treatment-resistant sinusitis to evaluate for anatomic blockage.
  - Patients with anatomic abnormalities may require surgery. Patients should also be referred for sinus cultures either by direct aspirate or endoscopy of the middle meatus.

Relapse after oral therapy

- Recurrence of symptoms within two weeks of response to initial oral treatment usually represents inadequate eradication of infection.
- Patients who had a good response to initial oral therapy and who have mild symptoms can be treated with a longer course of the same antibiotic.
- Patients whose relapse is moderate to severe, however, are more likely to have resistant organisms and require a change in the drug selected.
- Patients with relapse should be treated for at least 7 to 10 days. If symptoms persist despite a repeat 7- to 10-day course of antibiotics, referral is warranted.

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