Diagnosis and Management of Acute Bacterial Sinusitis: 2013 AAP Guideline

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Diagnosis and Management of Acute Sinusitis

- Update of 2001 guideline
- Focuses on ages 1–18 years
- Not subacute or chronic; not <1 year
- Not anatomic abnormalities; immunodeficiencies, cystic fibrosis, ciliary dyskinesia
Diagnosis and Management of Acute Sinusitis

Areas of change:

1. Addition of “worsening course”
2. New data on effectiveness of antibiotics
3. Option to observe for 3 days in “persistent” infection
4. Imaging is not necessary to identify or confirm a diagnosis of acute sinusitis
Key Action Statement 1

Clinicians should make a diagnosis of acute bacterial sinusitis (ABS) when a child with an upper respiratory infection (URI) presents with:

- **Persistent illness** (nasal discharge or daytime cough or both for ≥10 days without improvement)
- **Worsening course** (worsening or new onset of nasal discharge, daytime cough or fever after initial improvement)
- **Severe onset** (concurrent fever and purulent nasal discharge for 3 days)
Uncomplicated Viral URI

Severity

(days)

Respiratory symptoms

Fever
Common Clinical Presentations for ABS

Persistent Symptoms

Severe Worsening
Acute Sinusitis “Persistent Symptoms”

- 10–30 days (no improvement)
- Nasal discharge (any quality)
- Daytime cough (worse at night)
- Fever – variable
- Headache and facial pain – variable
Persistent Symptoms

- Only 6–8% of children meet criteria

Before concluding that child has sinusitis:

- Differentiate between sequential episodes of URI and sinusitis
- Establish that symptoms are NOT improving
Acute Sinusitis “Severe Symptoms”

- High fever (T ≥39° C) and
- Purulent nasal discharge concurrently for at least 3–4 days

- Need to distinguish from uncomplicated viral infections with moderate illness
“Worsening Symptoms”

- Typical viral URI
- Nasal discharge or cough or both for 5–6 days which is improving
- Sudden worsening manifests as
  - Increase nasal discharge or cough or both
  - Onset of severe headache
  - Onset of new fever
Images – Key Action Statement 2A

Clinicians should not obtain imaging studies (plain x-rays, computed tomography [CT], magnetic resonance imaging [MRI] or ultrasound [U/S]) to distinguish ABS from viral URI.
Images

- Historically, imaging was confirmatory
- No longer recommended
- Continuity of respiratory mucosa leads to diffuse inflammation during viral URI
- Responsible for controversy regarding images
Imaging of Sinuses

- **1940s** – Observations made regarding frequency of abnormal sinus radiographs in “healthy” children.
- **1970s and 1980s** – Children with URI had frequent abnormalities of paranasal sinuses.
- As CT scanning of central nervous system (CNS) and skull became prevalent, incidental abnormalities observed.
- When MRI performed in children with URI, 70% show major abnormalities of mucosa.
Computed Tomographic Study of the Common Cold

- 31 healthy young adults with new “cold”
- Recruited within 48–96 hours
- To have CT of paranasal sinuses
- 87% had significant abnormalities of their maxillary sinuses; 2 with air-fluid level
- Conclusion: Common cold associated with frequent and striking abnormalities of sinuses

Abnormalities on CT Scan
Summary of Imaging

- When paranasal sinuses are imaged in any way in children with uncomplicated URI, majority will be significantly abnormal.

- Normal images = No sinusitis

- Abnormal images cannot confirm diagnosis and are not necessary in children with uncomplicated clinical sinusitis.
Images – Key Action Statement 2B

Clinicians should obtain a contrast-enhanced CT scan of the paranasal sinuses and/or an MRI with contrast whenever a child is suspected of having orbital or CNS complications of ABS.
Complications of Sinusitis

Orbital

a. sympathetic effusion
b. subperiosteal abscess
c. orbital abscess
d. orbital cellulitis
e. cavernous sinus thrombosis
Orbital Complications of Sinusitis

- Proptosis – anterior and lateral displacement of globe
- Impairment of extraocular movements
- Loss of visual acuity
- Chemoisis – edema of conjunctiva
Diagnosis

- Sympathetic effusion or inflammatory edema
- Subperiosteal abscess
- Orbital abscess
- Orbital cellulitis
CNS Complications of ABS

Suspected with very severe headache, photophobia, seizure, other focal neurologic findings

- Subdural empyema
- Epidural empyema
- Venous thrombosis
- Brain abscess
- Meningitis
Initial Management of ABS

- **Key Action Statement 3A**: Clinician should prescribe antibiotic therapy for ABS in children with severe onset or worsening course.

- **Key Action Statement 3B**: Clinician should either prescribe antibiotic therapy OR offer additional outpatient observation for 3 days to children with persistent illness.
Initial Management of ABS

Guidance for clinician regarding management of children with persistent symptoms:

- Antibiotic therapy – starting as soon as possible after the encounter
- Additional outpatient observation – for 3 days with plan to begin antibiotics if child does not improve or worsens at any time
Initial Management of ABS

- Contrasts with 2001 AAP guideline
- Acknowledges that although ABS is a bacterial infection
  - spontaneous resolution ~ common
  - 10 days is a guideline; no likely harm in allowing up to 3 more days in persistent onset
- Reinforces antibiotic treatment as soon as possible in severe or worsening illness
# Recommendations for Initial Use of Antibiotics for ABS

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>Severe ABS</th>
<th>Worsening ABS</th>
<th>Persistent ABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncomplicated ABS without coexisting illness</td>
<td>Antibiotic</td>
<td>Antibiotic</td>
<td>Antibiotic OR Additional observation</td>
</tr>
<tr>
<td>ABS with orbital or CNS complication</td>
<td>Antibiotic</td>
<td>Antibiotic</td>
<td>Antibiotic</td>
</tr>
<tr>
<td>ABS with other bacterial infection</td>
<td>Antibiotic</td>
<td>Antibiotic</td>
<td>Antibiotic</td>
</tr>
</tbody>
</table>
Key Action Statement 4

Clinicians should prescribe amoxicillin with or without clavulanate as first-line treatment when a decision has been made to initiate antibiotic treatment of ABS.
Microbiology of ABS, 1984

- *Streptococcus pneumoniae* 30%
- *Haemophilus influenzae* 20%
- *Moraxella catarrhalis* 20%
- *Streptococcus pyogenes* 4%
- Sterile 25%
Microbiology of Acute Sinusitis

- Gleaned from microbiology of acute otitis media (AOM)
- Similar pathogenesis and pathophysiology
- Middle ear is a paranasal sinus
Microbiology of AOM

- *Streptococcus pneumoniae*
- *Haemophilus influenzae*
- *Moraxella catarrhalis*

- Routine use of pneumococcal vaccines has been associated with a decrease of *S pneumoniae* and an increase of *H influenzae*. 
# Microbiology of AOM

<table>
<thead>
<tr>
<th></th>
<th>Early PCV7</th>
<th>Late PCV7</th>
<th>Early PCV13</th>
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</thead>
<tbody>
<tr>
<td><em>S. pneumoniae</em></td>
<td>30</td>
<td>45</td>
<td>20</td>
</tr>
<tr>
<td><em>H. influenzae</em></td>
<td>50</td>
<td>25</td>
<td>55</td>
</tr>
</tbody>
</table>
Suspected Microbiology of ABS, 2013

- *Streptococcus pneumoniae* 15–20%
- *Haemophilus influenzae* 45–50%
- *Moraxella catarrhalis* 10–15%
- *Streptococcus pyogenes* 5%
- Sterile 25%
Antibiotic Resistance

- *S. pneumoniae*: 10–15%; can increase up to 50%
- *H. influenzae*: 10–68%
- *M. catarrhalis*: 100%

- LIMITED CURRENT DATA ON MICROBIOLOGY
**Treatment**

- Amoxicillin – traditional first-line therapy
- Amoxicillin at 45 mg/kg/day in 2 doses
- If high prevalence of penicillin-resistant *S. pneumoniae*
- Amoxicillin at 90 mg/kg/day in 2 doses
Treatment

- Amoxicillin ineffective against beta-lactamase producing bacteria

- Choices:
  - drug inherently resistant to beta-lactamase
  - combine amoxicillin with irreversible beta-lactamase inhibitor = K clavulanate
Treatment

- If *S pneumoniae* remains low or continues to decrease and *H influenzae* remains high or continues to increase (including β-lactamase (+) strains)
  - Amoxicillin-clavulanate 45 mg/kg day
  - Amoxicillin-clavulanate 90 mg/kg/day
Treatment

- 50 mg/kg Ceftriaxone IV or IM

Allergy:

- Cephalosporins: cefdinir, cefuroxime, cefpodoxime
- Clindamycin (or linezolid) + cefixime
- Levofloxacin
Treatment

- Optimal duration: no systematic study
- Duration of therapy: 10, 14, 21, 28 days
- Treat until patient is free of symptoms plus 7 days
Key Action Statement 5A

Clinicians should reassess initial management if there is caregiver report of worsening OR failure to improve within 72 hours.
Response to Appropriate Management

- Most patients with ABS who are treated with an appropriate antimicrobial agent respond promptly (within 48–72 hours)
- Worsening = progression of signs/symptoms
- Failure to improve = not better or worse
Key Action Statement 5B

If worsening symptoms or failure to improve clinicians should change antibiotics or initiate antibiotics in child managed with observation.
Management of ABS at 72 Hours

Whether or not antibiotics are used, a system must be in place to either add antibiotic or change the antibiotic if symptoms do not improve in 48–72 hours.
## Management of Worsening or No Improvement

<table>
<thead>
<tr>
<th>Initial Management</th>
<th>Worse in 72 Hours</th>
<th>No Improvement in 72 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Amoxicillin + clavulanate</td>
<td>Observation OR Initiate antibiotic</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>Amoxicillin-clavulanate</td>
<td>Observation OR Amoxicillin-clavulanate</td>
</tr>
<tr>
<td>Amoxicillin-clavulanate</td>
<td>Clindamycin + cefixime OR Linezolid + cefixime OR Levofloxacin OR Cefuroxime, Cefdinir OR Cefpodoxime</td>
<td>Amoxicillin-clavulanate OR Same choices as in preceding box</td>
</tr>
</tbody>
</table>
Adjuvant Therapies – No Recommendation

- Antihistamines
- Intranasal steroids
- Intranasal saline
- Decongestants
Summary

- Use stringent criteria to diagnose sinusitis in children.
- Avoid obtaining images.
- Amoxicillin with or without clavulanate
- High-dose amoxicillin plus clavulanate for resistance (most comprehensive)
- Adjuvant therapy rarely indicated
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