Guidelines in Allergic Rhinitis and Sinusitis

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Disclosures

• Medtronic – Consultant
  • There will be no discussion of Medtronic devices in this talk
Objectives

1. To discuss the AAO-HNS Guidelines on Allergic Rhinitis in adults and children
2. To distinguish the diagnosis and management recommended by the AAP Guideline on acute bacterial sinusitis
3. To compare the acute bacterial sinusitis guidelines from the Infectious Disease Society of America to those of the AAP
4. To examine the AAO-HNS Clinical Consensus Statement on Chronic Rhinosinusitis in children
PRACTICE CHANGE

• Recognize that sinonasal imaging should not routinely be performed in children presenting with symptoms consistent with a diagnosis of allergic rhinitis or uncomplicated acute bacterial sinusitis
Allergic rhinitis (AR) is one of the most common diseases affecting adults. It is the most common chronic disease in children in the United States today; and is the fifth most common chronic disease in the U.S overall.

AR is estimated to affect nearly one in every six Americans and generates $2 to $5 billion dollars in direct health expenditures annually.

It can impair quality of life and through, loss of work and school, is responsible for as much as $2 to $4 billion dollars in lost productivity annually.
Scope: Children >2 years & adult patients with Allergic Rhinitis
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Allergic rhinitis (AR)</strong></td>
<td>Allergic rhinitis is an IgE mediated inflammatory response of the nasal mucous membranes after exposure to inhaled allergens. Symptoms include rhinorrhea (anterior or posterior nasal drainage), nasal congestion, nasal itching, and sneezing.</td>
</tr>
<tr>
<td><strong>Seasonal allergic rhinitis (SAR)</strong></td>
<td>Caused by an IgE-mediated inflammatory response to seasonal aeroallergens. The length of seasonal exposure to these allergens is dependent on geographic location and climatic conditions.</td>
</tr>
<tr>
<td><strong>Perennial allergic rhinitis (PAR)</strong></td>
<td>Caused by an IgE-mediated inflammatory response to year round environmental aeroallergens. These may include dust mites, mold, animal allergens, or certain occupational allergens.</td>
</tr>
<tr>
<td><strong>Intermittent allergic rhinitis</strong></td>
<td>Caused by an IgE-mediated inflammatory response and is characterized by frequency of exposure/ symptoms (&lt; 4 days/week or &lt; 4 weeks/year).</td>
</tr>
<tr>
<td><strong>Persistent allergic rhinitis</strong></td>
<td>Caused by an IgE-mediated inflammatory response and is characterized by persistent symptoms (&gt; 4 days/week and &gt; 4 weeks/year).</td>
</tr>
<tr>
<td><strong>Episodic allergic rhinitis</strong></td>
<td>Caused by an IgE-mediated inflammatory response and can occur if an individual is in contact with an exposure that is not normally a part of the individual’s environment. (i.e., a cat at your friend’s house)</td>
</tr>
</tbody>
</table>
Clinical diagnosis of allergic rhinitis when patients present with a history and physical exam consistent with an allergic cause and one or more of the following symptoms:

- nasal congestion
- runny nose
- itchy nose
- sneezing

Findings of AR consistent with an allergic cause include:

- clear rhinorrhea
- nasal congestion
- pale discoloration of the nasal mucosa
- red and watery eyes
2. ALLERGY TESTING (Recommendation)

Clinicians should perform and interpret, or refer to a clinician who can perform and interpret, specific IgE (skin or blood) allergy testing for patients with a clinical diagnosis of allergic rhinitis who:

- Do not respond to empiric treatment
- When the diagnosis is uncertain
- When knowledge of the specific causative allergen is needed to target therapy
3. IMAGING (Recommendation Against)

Clinicians should not routinely perform sinonasal imaging in patients presenting with symptoms consistent with a diagnosis of allergic rhinitis
4. ENVIRONMENTAL FACTORS (Option)

Clinicians may advise:
- Avoidance of known allergens or
- Environmental controls (i.e. removal of pets, the use of air filtration systems, bed covers, and acaricides [chemical agents that kill dust mites])

In allergic rhinitis patients who have identified allergens that correlate with clinical symptoms
5. CHRONIC CONDITIONS AND COMORBIDITIES (Recommendation)

Clinicians should assess and document in the medical record patients with a clinical diagnosis of allergic rhinitis for the presence of associated conditions such as:

- Asthma
- Atopic dermatitis
- Sleep disordered breathing
- Conjunctivitis
- Rhinosinusitis
- Otitis media
6. TOPICAL STEROIDS (Strong Recommendation)

Clinicians should recommend intranasal steroids for patients with a clinical diagnosis of allergic rhinitis whose symptoms impact their quality of life (QOL)
7. ORAL ANTIHISTAMINE (Strong Recommendation)

Clinicians should recommend oral second generation/less sedating antihistamines for patients with allergic rhinitis and primary complaints of sneezing and itching.
8. INTRANASAL ANTIHISTAMINES (Option)

Clinicians may offer intranasal antihistamines for patients with seasonal, perennial, or episodic allergic rhinitis
9. ORAL LEUKOTRIENE RECEPTOR ANTAGONISTS (Recommendation against)

Clinicians should not offer oral leukotriene receptor antagonists as primary therapy for patients with allergic rhinitis
10. COMBINATION THERAPY (Option)

Clinicians may offer combination pharmacologic therapy in patients with allergic rhinitis who have inadequate response to pharmacologic monotherapy.
11. IMMUNOTHERAPY (Recommendation)

Clinicians should offer or refer to a clinician who can offer immunotherapy (sublingual or subcutaneous) for patients with allergic rhinitis who have inadequate response to symptoms with pharmacologic therapy with or without environmental controls.
12. INFERIOR TURBUNATE REDUCTION (Option)

Clinicians may offer, or refer to a surgeon who can offer, inferior turbinate reduction in patients with allergic rhinitis with:
• Nasal airway obstruction AND
• Enlarged inferior turbinates
• Who have failed medical management
13. ACUPUNCTURE (Option)

Clinicians may offer acupuncture, or refer to a clinician who can offer acupuncture, for patients with allergic rhinitis who are interested in non-pharmacologic therapy.
14. HERBAL THERAPY (No Recommendation)

No recommendation regarding the use of herbal therapy for patients with allergic rhinitis
AAP
Clinical Practice Guideline: Acute Bacterial Sinusitis
(Published 2013)
Infectious Diseases Society of America
Clinical Practice Guideline:
Acute Bacterial Rhinosinusitis
(Published 2012)
Acute bacterial sinusitis (ABS) affects 6% - 7% of children

Children 1 to 18 years

Exclude

- Sinus abnormalities
- Immunodeficiencies
- Cystic Fibrosis
- Primary Ciliary Dyskinesia
AAP KAS 1: Diagnosis (Recommendation)

Presumptive Diagnosis of ABS when child with acute URI presents with:

- Persistent illness (nasal drainage) or daytime cough >10D without improvement OR

- Worsening course (nasal discharge, **daytime cough**, fever) OR

- Severe onset (concurrent fever ($\geq 39^\circ C$)) & purulent nasal discharge for at least 3 consecutive days
**IDSA Initial Treatment: Diagnosis**

Diagnosis of ABS vs Viral Rhinosinusitis:

- Persistent symptoms or signs compatible with ABS ≥ 10D without improvement OR

- Onset with severe symptoms or high fever (≥39°C) and purulent nasal drainage or facial pain for at least 3-4 consecutive days at the beginning of the illness

- Worsening symptoms/signs = NEW:
  - Nasal discharge increase, headache, fever) following typical viral URI that lasted 5-6 days and were initially improving
### IDSA Initial Treatment: Diagnosis

**Table 2. Conventional Criteria for the Diagnosis of Sinusitis Based on the Presence of at Least 2 Major or 1 Major and ≥2 Minor Symptoms**

<table>
<thead>
<tr>
<th>Major Symptoms</th>
<th>Minor Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Purulent anterior nasal discharge</td>
<td>• Headache</td>
</tr>
<tr>
<td>• Purulent or discolored posterior nasal discharge</td>
<td>• Ear pain, pressure, or fullness</td>
</tr>
<tr>
<td>• Nasal congestion or obstruction</td>
<td>• Halitosis</td>
</tr>
<tr>
<td>• Facial congestion or fullness</td>
<td>• Dental pain</td>
</tr>
<tr>
<td>• Facial pain or pressure</td>
<td>• Cough</td>
</tr>
<tr>
<td>• Hyposmia or anosmia</td>
<td>• Fever (for subacute or chronic sinusitis)</td>
</tr>
<tr>
<td>• Fever (for acute sinusitis only)</td>
<td>• Fatigue</td>
</tr>
</tbody>
</table>

Modified from Meltzer et al [7].
AAP KAS 2: Diagnosis (Strong Recommendation)

• NOT obtain imaging studies to distinguish ABS from viral URI

• Should obtain contrast-enhanced CT scan of paranasal sinuses and/or MRI with contrast when a child is suspected of:
  • Orbital or central nervous system complications of ABS
IDSA Management

• Imaging if suspect suppurative complications
  • CT axial and coronal (NOT MRI)

• Referral to specialist (oto, ID, allergist)
  • Seriously ill & immunocompromised
  • Continue deterioration on antibiotics
  • Recurrent acute rhinosinusitis with clearing between episodes
AAP KAS 3: Initial Management (Strong Recommendation/Recommendation)

- Severe onset or worsening course of ABS
  - Prescribe an antibiotic

- Persistent Illness (any nasal DC, cough for at least 10 days)
  - Prescribe an antibiotic OR
  - Offer additional observation for 3 days
AAP KAS 4: Management (Recommendation)

- Prescribe Amoxicillin with/without Clavulanate 1st Line
- Once decision made to initiate antibiotics
IDSA Initial Treatment: Treatment

• Initiate empiric antimicrobial therapy as soon as meet criteria for ABS
• Recommend Amoxicillin-Clavulanate for initial treatment
• High-dose Amoxicillin-Clavulanate (2g orally BID or 90 mg/kg/day divided BID) in areas with:
  • $\geq 10\%$ rates of invasive PCN-nonsusceptible S pneumo
  • Severe Infection (toxicity, fever ($\geq 39^\circ$C), threat suppurative complications)
  • Attendance in daycare
  • Age $<$2
  • Abx use in the past month
  • Immunocompromised
### Table 3. Meta-analyses of Antibiotic Treatment Versus Placebo in Patients With Acute Rhinosinusitis

<table>
<thead>
<tr>
<th>Patient Population</th>
<th>No. of Studies</th>
<th>Antibiotic</th>
<th>Placebo</th>
<th>OR (95% CI)</th>
<th>No. Needed to Treat (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults [45, 46, 47–60]</td>
<td>17</td>
<td>1213/1665 (72.9)</td>
<td>989/1521 (65.0)</td>
<td>1.44 (1.24–1.68)</td>
<td>13 (9–22)</td>
</tr>
<tr>
<td>Children [61, 62, 63, 64]</td>
<td>3</td>
<td>151/192 (78.5)</td>
<td>70/118 (59.7)</td>
<td>2.52 (1.52–4.18)</td>
<td>5 (4–15)</td>
</tr>
</tbody>
</table>
IDSA Initial Treatment: Treatment

- Recommend Amoxicillin-Clavulanate (beta-lactam) vs a respiratory fluoroquinolone for initial treatment
- Macrolides are not recommended for empiric tx
  - Due to high resistance in S pneumo (30%)
- Not recommend trimethoprim-sulfamethoxazole
  - Due to high resistance in S pneumo/H Flu (30-40%)
- Doxycycline may be initial therapy in adults
AAP KAS 5: Management (Recommendation)

- Reassess initial management if there is:
  - Caregiver report of worsening (progression or symptoms or appearance of new symptoms) OR
  - Failure to improve within 72 hours of initial management

- ABS confirmed with worsening symptoms or failure to improve within 72 hours
  - Change the antibiotic if already treated OR
  - Initiate antibiotic therapy if observed
### Table 4: Management of Worsening or Lack of Improvement at 72 Hours

<table>
<thead>
<tr>
<th>Initial Management</th>
<th>Worse in 72 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Initiate amoxicillin with or without clavulanate</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>High-dose amoxicillin-clavulanate</td>
</tr>
<tr>
<td>High-dose amoxicillin-clavulanate</td>
<td>Clindamycin&lt;sup&gt;a&lt;/sup&gt; and cefixime OR linezolid and cefixime OR levofloxacin</td>
</tr>
</tbody>
</table>

<sup>a</sup> Clindamycin is recommended to cover penicillin-resistant *S. pneumoniae*. Some communities have high levels of clindamycin-resistant *S. pneumoniae*. In these communities, linezolid is preferred.
IDSA Nonresponsive Patient: Treatment

- Change strategy if unresponsive after 48-72 hours
  - Evaluate for resistant pathogens, noninfectious etiology, structural abnormality
- Directed cultures (direct aspiration)
  - Consider endoscopically guided of middle meatus in adults
  - Nasopharyngeal cultures are unreliable
IDSA 2nd Line Treatment: Treatment

- Not recommend 2nd/3rd gen cephalosporins as monotx
  - Combo with 3rd gen oral cephalosporin (cefixime/cefpodoxime) plus clindamycin as 2nd line therapy
- Levofloxacin recommended for children allergic to PCN (type 1 hypersensitivity)

- Not recommend initial therapy against Staph aureus

- Duration 10-14 days in children
**IDSA 2\textsuperscript{nd} Line Treatment: Treatment**

*Table 9. Antimicrobial Regimens for Acute Bacterial Rhinosinusitis in Children*

<table>
<thead>
<tr>
<th>Indication</th>
<th>First-line (Daily Dose)</th>
<th>Second-line (Daily Dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial empirical therapy</strong></td>
<td>Amoxicillin-clavulanate (45 mg/kg/day PO bid)</td>
<td>Amoxicillin-clavulanate (90 mg/kg/day PO bid)</td>
</tr>
<tr>
<td><strong>β-lactam allergy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type I hypersensitivity</td>
<td>Levofloxacin (10-20 mg/kg/day PO every 12-24 h)</td>
<td></td>
</tr>
<tr>
<td>Non-type I hypersensitivity</td>
<td>Clindamycin* (30–40 mg/kg/day PO tid) plus cefixime (8 mg/kg/day PO bid) or cefpodoxime (10 mg/kg/day PO bid)</td>
<td></td>
</tr>
<tr>
<td><strong>Risk for antibiotic resistance or failed initial therapy</strong></td>
<td>Amoxicillin-clavulanate (90 mg/kg bid)</td>
<td></td>
</tr>
<tr>
<td>Severe infection requiring hospitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampicillin/sulbactam (200-400 mg/kg/day IV every 6 h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ceftriaxone (50 mg/kg/day IV every 12 h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cefotaxime (100-200 mg/kg/day IV every 6 h)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levofloxacin (10-20 mg/kg/day IV every 12-24 h)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AAP No Recommendation

- Adjuvant Therapy
  - Intranasal steroids – likely help but methodologic issues
- Decongestants
- Antihistamines
- Nasal Irrigation

Insufficient Data
IDSA Other Therapy: Treatment

• Nasal saline irrigation recommended as adjunctive treatment
• Intranasal steroids are recommended
• Decongestants & antihistamines are NOT recommended
AAO-HNS
Clinical Consensus Statement:
Chronic Pediatric Rhinosinusitis
(Published 2015)
Definition of Pediatric Chronic Rhinosinusitis

- Pediatric chronic rhinosinusitis is defined as:
  - At least 90 continuous days of >2 symptoms:
    - Purulent rhinorrhea
    - Nasal obstruction
    - Facial pressure/pain or
    - Cough AND
  - Endoscopic signs:
    - Mucosal edema
    - Purulent drainage or
    - Nasal polyposis AND/OR
  - CT changes:
    - Mucosal changes within the ostiomeatal complex and/or sinuses
Diagnostics

• Nasal endoscopy (flexible or rigid) is appropriate in evaluating a child with CRS to document:
  • Purulent drainage
  • Mucosal edema
  • Nasal polyps
  • Adenoid pathology (hyperplasia, infection)

• Management of children with nasal polyps and CRS is distinctly different than management of children with CRS unaccompanied by nasal polyps
Diagnostics

• Management of children aged 12 years and younger with CRS is distinctly different than management of children aged 13 to 18 years old with CRS.
• **Adenoiditis** is an important contributing fact to PCRS, especially in younger children.
• The ability of the adenoid to serve as a bacterial reservoir for PCRS is independent of adenoid size.
Relationship between bacteriology of the adenoid core and middle meatus in children with sinusitis

S ELWANY, A N EL-DINE, A EL-MEDANY, A OMRAH, Z MANDOUR, A ABD EL-SALAM

Identification of adenoid biofilms in chronic rhinosinusitis

Giancarlo Zulliani, Michael Carron, Jose Gurrola, Crystal Coleman, Michael Haupert, Richard Berk, James Coticchia

TABLE I
POSTIVE SAMPLE CULTURES*

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Adenoid core (n (%))</th>
<th>Middle meatus (n (%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coag -ve staph</td>
<td>42 (40.8)</td>
<td>43 (41.7)</td>
</tr>
<tr>
<td>S aureus</td>
<td>23 (22.3)</td>
<td>34 (32)</td>
</tr>
<tr>
<td>S pneumoniae</td>
<td>19 (18.4)</td>
<td>29 (28.1)</td>
</tr>
<tr>
<td>H influenza</td>
<td>17 (16.5)</td>
<td>21 (21.6)</td>
</tr>
<tr>
<td>Grp A strep</td>
<td>16 (15.5)</td>
<td>20 (19.4)</td>
</tr>
<tr>
<td>Diphtheroids</td>
<td>19 (18.4)</td>
<td>18 (18.5)</td>
</tr>
<tr>
<td>Other</td>
<td>24 (23.3)</td>
<td>35 (33.9)</td>
</tr>
</tbody>
</table>

*For a total of 103 cases. Coag -ve staph = coagulase-negative staphylococci; grp A strep = group A streptococci

Table 1: Patient demographics, diagnosis, and presence or absence of biofilms

<table>
<thead>
<tr>
<th>Age/gender</th>
<th>Diagnosis</th>
<th>Presence of biofilms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years, M</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>2 years, M</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>2 years, M</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>6 years, M</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>3 years, F</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>3 years, F</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>10 years, M</td>
<td>CRS</td>
<td>+</td>
</tr>
<tr>
<td>9 months, M</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>13 months, M</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>16 months, M</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>5 years, M</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>3 years, F</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>4 years, M</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>5 years, F</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>5 years, M</td>
<td>OSA</td>
<td>-</td>
</tr>
<tr>
<td>3 months, M</td>
<td>OSA</td>
<td>-</td>
</tr>
</tbody>
</table>
Diagnostics

• **Allergic rhinitis** is an important contributing factor to PCRS, especially in older children.
Prevalence of and associations with allergic rhinitis in children with chronic rhinosinusitis

Ahmad R. Sedaghat a,b, Wanda Phipatanakul b, Michael J. Cunningham c,d

Conclusions: AR is more prevalent than the other comorbidities combined in children with CRS, and is independently associated with the presence of asthma. Formal allergy testing, guided by clinical history and regional allergen sensitivity prevalence, should be strongly considered in all children with CRS, in particular those with reactive airway disease.

Pediatric sinusitis: symptom profiles with associated atopic conditions.
Tantimongkoluk C, Pornrattanarungsut C, Chiewwit P, Visitsunthorn N, Ungkanont K, Vichyanond P.

RESULTS: Age range of the 100 patients was between 1.7 to 12.4 years with a mean (+/- SD) of 6 +/- 2.72 years. History of atopic disease among patients and their families was positive in 48% and 47% respectively. Four most common clinical manifestations were rhinorrhea (95%), nocturnal and productive cough (91%), nasal congestion (74%) and posterior nasal dripping (66%). The three most common signs were obstruction of middle meatus (100%), swelling of turbinates (92%) and granular pharynx (48%). All paranasal sinuses X-rays were abnormal with maxillary sinus being the most commonly involved sinus (99%) followed by ethmoid sinus (91%). The majority of patients had involvement of more than one sinus. Skin prick tests were positive in 53.6%. The two most common sensitizing allergens were dust mites (57.7) and cockroaches (18.6%).
Atopy and the Development of Chronic Rhinosinusitis in Children with Allergic Rhinitis

Ahmad R. Sedaghat, MD, PhD1,2,4, Wanda Phipatanakul, MD, MS3, and Michael J. Cunningham, MD2,4

This study demonstrates the degree of atopy, as reflected by the number of aeroallergen sensitivities or the presence of atopic comorbidities, is not associated with progression to CRS in the pediatric age group.

Chronic sinusitis among pediatric patients with chronic respiratory complaints

Kim-Lien Nguyen, MD, Mark L. Corbett, MD, Daniel P. Garcia, MD, Steve M. Eberly, MD, Evan N. Massey, MD, Ha T. Le, MD, Loretta T. Shearer, MD, John M. Karibo, MD, and Hobert L. Pence, MD

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VOLUME 92, NUMBER 6

TABLE III. Associated risk factors: Nasal structural abnormalities, skin tests, cigarette smoke exposure, and age

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Abnormal sinus CT scan (no.)</th>
<th>Negative sinus CT scan (no.)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin test results</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>32/51 (63%)</td>
<td>19/51 (37%)</td>
<td>0.27</td>
</tr>
<tr>
<td>Negative</td>
<td>27/36 (75%)</td>
<td>9/36 (25%)</td>
<td></td>
</tr>
</tbody>
</table>
Appropriate Use of Computed Tomography for Paranasal Sinus Disease (2012)

• CT imaging is indicated in pediatric patients:
  • For chronic sinusitis when medical management and/or adenoidectomy have failed to control symptoms
  • Is indicated at any age for suspected tumor, complications from sinusitis, and prior to sinus surgery
  • May be limited by radiation safety concerns and possible requirement for sedation, especially in children younger than 6 years
  • Is not indicated in patients younger than 3 years for uncomplicated acute sinusitis without appropriate prior medical management
Medical Therapy: Topical

• Daily, topical nasal saline irrigations are a beneficial adjunctive medical therapy for PCRS.

• Daily, topical nasal steroids are a beneficial adjunctive medical therapy for PCRS.
Nasal saline irrigations for the symptoms of chronic rhinosinusitis

Richard Harvey¹, Saiful Alam Hannan², Lydia Badia³, Glenis Scadding⁴

¹Otolaryngology, Head & Neck Surgery/Cochrane ENT Disorders Group, Royal National Throat Nose and Ear Hospital, London/John Radcliffe Hospital, Oxford, Oxford, UK. ²ENT, Royal National Throat, Nose & Ear Hospital, London, UK. ³ENT, Royal National Throat, Nose & Ear Hospital, London, UK. ⁴Department of Rhinology, Royal National Throat, Nose & Ear Hospital, London, UK

Analysis 1.1. Comparison 1 A: Comparison of saline versus no treatment, Outcome 1 Symptom scores.

Review: Nasal saline irrigations for the symptoms of chronic rhinosinusitis

Comparison: 1 A: Comparison of saline versus no treatment

Outcome: 1 Symptom scores

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment N</th>
<th>Mean (SD)</th>
<th>Control N</th>
<th>Mean (SD)</th>
<th>Std. Mean Difference IV,Fixed,95% CI</th>
<th>Weight</th>
<th>Std. Mean Difference IV,Fixed,95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garavello 2003</td>
<td>10</td>
<td>-0.5 (5.36)</td>
<td>10</td>
<td>-3 (5.36)</td>
<td>[0.45 [-0.44, 1.34]]</td>
<td>21.7%</td>
<td></td>
</tr>
<tr>
<td>Garavello 2005a</td>
<td>20</td>
<td>1.5 (2.62)</td>
<td>20</td>
<td>-7 (3.11)</td>
<td>[2.90 [1.99, 3.81]]</td>
<td>20.7%</td>
<td></td>
</tr>
<tr>
<td>Rabago 2002</td>
<td>46</td>
<td>1.6 (1.36)</td>
<td>23</td>
<td>0.01 (0.96)</td>
<td>[1.26 [0.72, 1.81]]</td>
<td>57.7%</td>
<td></td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>76</td>
<td>53</td>
<td></td>
<td></td>
<td>[1.42 [1.01, 1.84]]</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Chi² = 14.99, df = 2 (P = 0.00056); I² = 87%
Test for overall effect: Z = 6.74 (P < 0.00001)
Safety and Efficacy of Once-Daily Nasal Irrigation for the Treatment of Pediatric Chronic Rhinosinusitis

Julie L. Wei, MD; Kevin J. Sykes, MPH; Philip Johnson, MD; Jianghua He, PhD; Matthew S. Maya, PhD, MBA

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Long-Term Outcome of Once Daily Nasal Irrigation for the Treatment of Pediatric Chronic Rhinosinusitis

Vinh Pham, BS; Kevin Sykes, MPH, CCRC; Julie Wei, MD

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**TABLE VI.** Change in Computed Tomography Scoring After Treatment.

<table>
<thead>
<tr>
<th></th>
<th>Saline</th>
<th>P Value (Within Group)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left maxillary</td>
<td>−0.64 ± 0.63</td>
<td>.002*</td>
</tr>
<tr>
<td>Right maxillary</td>
<td>−0.5 ± 0.65</td>
<td>.015*</td>
</tr>
<tr>
<td>Left anterior ethmoid</td>
<td>−0.79 ± 0.70</td>
<td>.003*</td>
</tr>
<tr>
<td>Right anterior ethmoid</td>
<td>−0.79 ± 0.80</td>
<td>.007*</td>
</tr>
<tr>
<td>Left posterior ethmoid</td>
<td>−0.57 ± 0.65</td>
<td>.009*</td>
</tr>
<tr>
<td>Right posterior ethmoid</td>
<td>−0.64 ± 0.63</td>
<td>.005*</td>
</tr>
<tr>
<td>Left sphenoid</td>
<td>−0.43 ± 0.65</td>
<td>.03*</td>
</tr>
<tr>
<td>Right sphenoid</td>
<td>−0.5 ± 0.65</td>
<td>.014*</td>
</tr>
<tr>
<td>Left frontal</td>
<td>−0.89 ± 0.78</td>
<td>.017*</td>
</tr>
<tr>
<td>Right frontal</td>
<td>−0.8 ± 0.63</td>
<td>.009*</td>
</tr>
<tr>
<td>Left OMC</td>
<td>−1 ± 1.03</td>
<td>.008*</td>
</tr>
<tr>
<td>Right OMC</td>
<td>−0.86 ± 1.29</td>
<td>.034*</td>
</tr>
<tr>
<td>Total score, left</td>
<td>−4.07 ± 3.25</td>
<td>.002*</td>
</tr>
<tr>
<td>Total score, right</td>
<td>−3.86 ± 3.11</td>
<td>.002*</td>
</tr>
</tbody>
</table>

---

**TABLE IV.** Long-Term Follow-Up and Parental Report of Outcome (n = 54).

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were your child’s problems successfully treated using irrigation?</td>
<td>Completely</td>
<td>38</td>
<td>70.4</td>
</tr>
<tr>
<td></td>
<td>Partially</td>
<td>13</td>
<td>24.1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
<td>3.7</td>
</tr>
<tr>
<td></td>
<td>Not sure</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>When symptoms recurred, did you start your child on irrigation,</td>
<td>Irrigation</td>
<td>33</td>
<td>61.1</td>
</tr>
<tr>
<td>medications, go to the doctor, or try other remedies?</td>
<td>Medication</td>
<td>25</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>Went to doctor</td>
<td>20</td>
<td>37.0</td>
</tr>
<tr>
<td></td>
<td>None of the above</td>
<td>9</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>5</td>
<td>9.3</td>
</tr>
<tr>
<td>Did irrigation help your child each time he/she used it?</td>
<td>Every time</td>
<td>25</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>18</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>Not sure</td>
<td>9</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>2</td>
<td>3.7</td>
</tr>
</tbody>
</table>
Topical treatment of rhinosinusitis

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We reviewed current clinical evidence for the use of topical treatments in pediatric rhinosinusitis. Repeated Entrez PubMed searches were done addition of intranasal corticosteroids as an adjunct to antibiotic therapy might have a modest benefit in the treatment of patients with recurrent acute or chronic rhinosinusitis (3).
Topical Therapy:
Statement NOT achieving Consensus

• Current evidence supports a role for topical antibiotic therapy in managing selected children with CRS.
Safety and Efficacy of Once-Daily Nasal Irrigation for the Treatment of Pediatric Chronic Rhinosinusitis

Julie L. Wei, MD; Kevin J. Sykes, MPH; Philip Johnson, MD; Jianghua He, PhD; Matthew S. Mayo, PhD, MBA

<table>
<thead>
<tr>
<th>Sinus</th>
<th>Baseline</th>
<th>Gentamicin</th>
<th>P Value</th>
<th>Postirrigation</th>
<th>Gentamicin</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Saline</td>
<td>Gentamicin</td>
<td></td>
<td>Saline</td>
<td>Gentamicin</td>
<td></td>
</tr>
<tr>
<td>Left maxillary</td>
<td>1.17±0.51</td>
<td>1±0.32</td>
<td>.21</td>
<td>0.67±0.49</td>
<td>0.44±0.51</td>
<td>.21</td>
</tr>
<tr>
<td>Right maxillary</td>
<td>1.28±0.46</td>
<td>1.10±0.44</td>
<td>.22</td>
<td>0.8±0.41</td>
<td>0.56±0.63</td>
<td>.16</td>
</tr>
<tr>
<td>Left anterior ethmoid</td>
<td>1.11±0.76</td>
<td>1.05±0.59</td>
<td>.73</td>
<td>0.47±0.64</td>
<td>0.19±0.40</td>
<td>.18</td>
</tr>
<tr>
<td>Right anterior ethmoid</td>
<td>1.06±0.64</td>
<td>0.86±0.65</td>
<td>.34</td>
<td>0.47±0.64</td>
<td>0.31±0.48</td>
<td>.54</td>
</tr>
<tr>
<td>Left posterior ethmoid</td>
<td>0.78±0.65</td>
<td>0.86±0.57</td>
<td>.65</td>
<td>0.4±0.51</td>
<td>0.13±0.31</td>
<td>.09</td>
</tr>
<tr>
<td>Right posterior ethmoid</td>
<td>0.78±0.65</td>
<td>0.76±0.62</td>
<td>.95</td>
<td>0.27±0.46</td>
<td>0.06±0.25</td>
<td>.13</td>
</tr>
<tr>
<td>Left sphenoid</td>
<td>0.61±0.61</td>
<td>0.67±0.80</td>
<td>1.0</td>
<td>0.27±0.46</td>
<td>0.19±0.40</td>
<td>.60</td>
</tr>
<tr>
<td>Right sphenoid</td>
<td>0.89±0.68</td>
<td>0.67±0.66</td>
<td>.30</td>
<td>0.40±0.51</td>
<td>0.25±0.45</td>
<td>.38</td>
</tr>
<tr>
<td>Left Frontal</td>
<td>1.10±0.83</td>
<td>0.64±0.67</td>
<td>.18</td>
<td>0.18±0.40</td>
<td>0±0</td>
<td>.10</td>
</tr>
<tr>
<td>Right frontal</td>
<td>0.93±0.70</td>
<td>0.31±0.48</td>
<td>.02</td>
<td>0.18±0.40</td>
<td>0.08±0.29</td>
<td>.49</td>
</tr>
<tr>
<td>Left OMC</td>
<td>1.78±0.65</td>
<td>1.71±0.72</td>
<td>.77</td>
<td>1.07±1.03</td>
<td>0.63±0.96</td>
<td>.22</td>
</tr>
<tr>
<td>Right OMC</td>
<td>1.78±0.65</td>
<td>1.71±0.72</td>
<td>.77</td>
<td>1.07±1.03</td>
<td>0.75±1</td>
<td>.38</td>
</tr>
<tr>
<td>Total score left</td>
<td>6.28±2.67</td>
<td>5.62±2.22</td>
<td>.51</td>
<td>3.0±2.70</td>
<td>1.56±1.9</td>
<td>.13</td>
</tr>
<tr>
<td>Total score right</td>
<td>6.5±2.41</td>
<td>5.29±2.28</td>
<td>.18</td>
<td>3.13±2.67</td>
<td>2.0±2.25</td>
<td>.18</td>
</tr>
</tbody>
</table>

0 = no opacification, 1 = partial opacification, 2 = complete opacification.
SD = standard deviation; OMC = ostiomeatal complex.
Medical Therapy: Systemic

• 20 consecutive days of antibiotic therapy may produce a superior clinical response in PCRS patients compared to 10 days of antibiotic therapy.

Mean: 7.44 Outliers: 0
Systemic Therapy:
Statements NOT achieving Consensus

• Appropriate antibiotic therapy for PCRS includes a minimum of 10 consecutive days of an antimicrobial medication that is effective against typical rhinosinusitis pathogens.
Is antibiotic treatment of chronic sinusitis effective in children?

A double-blind randomized controlled trial on 79 patients aged between 2 and 12 years with chronic sinusitis showed no significant advantage of adding antibiotics to the treatment by sinus lavage. The prognosis after both 6 and 12 weeks was worse for patients with bilateral opaque sinus radiographs.

Half of the *Haemophilus influenzae* cultured in this study were beta-lactamase producing organisms, therefore antibiotics prescribed for this group of children should be chosen bearing this in mind.

Keywords: chronic sinusitis, children, *Haemophilus influenzae*, beta-lactamase producing organisms, sinus radiographs.

Treatment consisted of aspiration of the sinus contents or antral washout followed by culturing of the contents, and antrostomy. Patients were then assigned blind to either cefaclor in a dose of 20 mg/kg/day divided in three equal doses, or a placebo for 1 week. If the course of the disease...
Treatment of chronic maxillary sinusitis in children

F.W.A. Otten and J.J. Grote

<table>
<thead>
<tr>
<th>Response patterns</th>
<th>Treatment groups</th>
<th>Total</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Placebo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid recovery</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent purulent rhinitis ultimately cured</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-lasting purulent rhinitis ultimately cured</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent purulent rhinitis not cured</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous purulent rhinitis</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>38</td>
<td>30</td>
<td>35</td>
</tr>
</tbody>
</table>

Total 141 100
Medical Therapy: Systemic

- **Culture-directed** antibiotic therapy may improve outcomes for PCRS patients who have not responded to empiric antibiotic therapy.

  Mean: 8.00 Outliers: 0
Medical Therapy: Systemic

- **Empiric treatment for gastroesophageal reflux disease** is not a beneficial adjunctive medical therapy for PCRS.

  Mean: 7.00

  Outliers: 0
Systemic Therapy:
Statements NOT achieving Consensus

• **Gastroesophageal reflux disease** (GERD) can contribute to PCRS

• Medical therapy for PCRS should include treatment for GERD when signs or symptoms of GERD are present
Is there evidence to link acid reflux with chronic sinusitis or any nasal symptoms? A review of the evidence*

E.P. Flook¹ and B.N. Kumar²

In the paediatric studies, the variability in the results comes from the low numbers used in these studies (mean = 22.5), no controls, the varying diagnostic criteria for CRS in children, GORD diagnostic criteria, selection and data collection bias and other confounding factors such as age, weight, co-morbidity and meals before bedtime. There are no randomised controlled studies and Table 3 shows that on analysis 4 out of the 6 paediatric papers had high risk of bias. As a result of this poor methodology of the papers, good conclusions regarding paediatric cases cannot come from the available evidence at present.
Clinical Consensus Statement: Pediatric Chronic Rhinosinusitis

Scott E. Brietke, MD, MPH¹, Jennifer Shin, MD², Sukgi Choi, MD³, Jivianne T. Lee, MD⁴, Sanjay R. Parikh, MD⁵, Maria Pena, MD⁶, Jeremy D. Prager, MD⁷, Hassan Ramadan, MD⁸, Maria Veling, MD⁹, Maureen Corrigan¹⁰, and Richard M. Rosenfeld, MD, MPH¹¹
1. Chronic rhinosinusitis (PCRS) is defined as at least 90 continuous days of 2 or more symptoms of purulent rhinorrhea, nasal obstruction, facial pressure/pain, or cough and either endoscopic signs of mucosal edema, purulent drainage, or nasal polyposis and/or CT scan changes showing mucosal changes within the ostiomeatal complex and/or sinuses in a pediatric patient aged 18 years or younger (Adapted from European Position Paper on Rhinosinusitis and Nasal Polyps 2012).
2. Management of children aged 12 years and younger with CRS is distinctly different than management of children aged 13 to 18 years old with CRS.
3. Nasal endoscopy (flexible or rigid) is appropriate in evaluating a child with CRS to document purulent drainage, mucosal edema, nasal polyps, and/or adenoid pathology (hyperplasia, infection).
4. Management of the children with nasal polyps and CRS is distinctly different than management of children with CRS unaccompanied by nasal polyps.
5. AR is an important contributing factor to PCRS, especially in older children.
6. Adenoiditis is an important contributing factor to PCRS, especially in younger children.
7. The ability of adenoids to serve as a bacterial reservoir for PCRS is independent of adenoid size.
AAO-HNSF List of 10 Things Physicians and Patients Should Question

The Initial List

1. Don’t order computed tomography (CT) scan of the head/brain for sudden hearing loss.

2. Don’t prescribe oral antibiotics for uncomplicated acute tympanostomy tube otorrhea.

3. Don’t prescribe oral antibiotics for uncomplicated acute external otitis.

4. Don’t routinely obtain radiographic imaging for patients who meet diagnostic criteria for uncomplicated acute rhinosinusitis.

5. Don’t obtain computed tomography (CT) or magnetic resonance imaging (MRI) in patients with a primary complaint of hoarseness prior to examining the larynx.

Choosing Wisely®

An initiative of the ABIM Foundation
AAO-HNSF List of 10 Things Physicians and Patients Should Question

Choosing Wisely®
An initiative of the ABIM Foundation

The Second List

6. Don’t place ear tubes in otherwise healthy children who have had a single episode of ear fluid lasting less than three months.

7. Don’t order imaging studies in patients with non-pulsatile bilateral tinnitus, symmetric hearing loss and an otherwise normal history and physical examination.

8. Don’t order more than one computerized tomography (CT) scan of the paranasal sinuses within 90 days to evaluate uncomplicated chronic rhinosinusitis patients when the paranasal sinus CT obtained is of adequate quality and resolution to be interpreted by the clinician and used for clinical decision-making and/or surgical planning.


10. Don’t routinely perform sinonasal imaging in patients with symptoms limited to a primary diagnosis of allergic rhinitis alone.
Thank You

Stacey Ishman, MD, MPH

Professor, Otolaryngology – Head & Neck Surgery
Surgical Director, Upper Airway Center
Cincinnati Children’s Hospital Medical Center

Stacey.ishman@cchmc.org
PRACTICE CHANGE

• Recognize that sinonasal imaging should not routinely be performed in children presenting with symptoms consistent with a diagnosis of allergic rhinitis or uncomplicated acute bacterial sinusitis