



**STATE OF LOUISIANA
DEPARTMENT OF HEALTH AND HOSPITALS**

**Judicious Antibiotic Use for
Five Most Common Conditions
(Otitis, Sinusitis, Pharyngitis,
Bronchitis, Rhinitis)**

**Reference guidelines
for health care practitioners**

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TABLE OF CONTENTS

Introduction	p. 3
Principles of Appropriate Use of Antimicrobial Agents.....	p. 4
1. Otitis Media:	p.p. 4-14
Principles	p. 4
1-1. Acute Otitis Media (AOM).....	p.p. 4-9
Definition	p.4
Diagnosis	p.p. 5-6
Treatment	p.p. 7-9
1-2. Otitis Media with Effusion (OME)	p.p.10-13
Definition.....	p.10
Diagnosis	p.p.10-11
Treatment	p.p. 11-12
General Principles of OME Management	p.p.12-13
Prevention of Otitis Media.....	p.p. 13-14
2. Acute Sinusitis (Rhinosinusitis)	p.p. 14-20
Principles	p. 14
Definition	p.p. 15-16
Diagnosis	p.p.16-17
Treatment	p.p. 17-19
Prevention of Sinusitis (Rhinosinusitis)	p.p. 19-20
3. Acute Pharyngitis (Sore Throat).....	p.p. 20-25
Principles	p.p. 20- 21
Definition	p.21
Diagnosis	p.p.21-22
Treatment	p.p.22-24
Prevention of Pharyngitis (Sore Throat).....	p.p. 24-25
4. Cough Illness/Bronchitis.....	p.25
Principles	p.p.20- 21
Definition	p.p.25-26
Diagnosis	p.p.26-27
Treatment	p.p.27-29
Prevention of Cough Illness/Bronchitis.....	p.29
5. The Common Cold	p.p.29-33
Principles	p.29
Definition	p.p.29-30
Diagnosis	p.p.30-32
Treatment	p.p.32-33
Prevention of The Common Cold	p.33
Appendices	p.p. 34-40
Appendix 1: Drawing of the Middle Ear.....	p.34
Appendix 2: Definitions and Common Names Useful for Non-Clinicians.....	p.34
Appendix 3: Abbreviations and Definitions of Types of Otitis	p.35
Appendix 4: Careful Antibiotic Use – Appropriate Treatment Summary.....	p.36
Appendix 5: Careful Antibiotic Use – Otitis Media (OM)	p.37
Appendix 6: Careful Antibiotic Use – Rhinitis Versus Sinusitis in Children	p.38
Appendix 7: Careful Antibiotic Use – Pharyngitis in Children	p.39
Appendix 8: Careful Antibiotic Use – Cough Illness/Bronchitis	p.40
References/Resources	p.41

Introduction

Increase in antibiotic resistance in numerous bacterial strains is a growing national and worldwide concern. The development of resistant pathogens complicates therapy, increases expenses and makes treatment failure more likely.

Widespread use of antimicrobials, whether appropriate or inappropriate, has driven the emergence and spread of resistant organisms. Currently, millions of courses of unnecessary antibiotics are given each year. Approximately 1 million prescriptions for antibiotics are written annually (2000) by office-based physicians in the United States. The majority of antibiotics prescribed to adults in ambulatory practice in the United States are for acute sinusitis, acute pharyngitis, acute bronchitis and nonspecific upper respiratory tract infections (including the common cold). Likewise, three fourths of all outpatient prescriptions for children are given for 5 conditions: otitis media, sinusitis, cough illness/bronchitis, pharyngitis and nonspecific upper respiratory tract infection (the common cold). According to the CDC about a half of the 235 million doses of antibiotics prescribed is unnecessary and inappropriate because they are used for conditions caused by viruses (such as common cold and chronic cough).

Acute otitis media (AOM) is the most common disease for which antibiotics are prescribed. Studies have shown this condition to be overdiagnosed and, hence, overtreated as much 50% of the time by clinicians caring for the children.

Carriers of a resistant bacterial strain who develop illness related to that strain are more likely to have antimicrobial therapy failure. In some conditions, such as otitis media with effusion (OME), observation without antimicrobial therapy is recommended, and in other conditions such as the common cold or cough, antimicrobial therapy is not indicated at all.

These guidelines are intended to help health care practitioners in deciding whether to prescribe antibiotics, choosing the most appropriate antibiotic and prescribing antibiotics for the correct duration.

To combat the spread of resistant organisms the following principles for appropriate antibiotic use should be fostered and implemented as appropriate.

Principles of Appropriate Use of Antimicrobial Agents

The following principles were published by the American Academy of Pediatrics (AAP), American Academy of Family Physicians (AAFP) and Centers for Disease Control and Prevention (CDC) to identify clinical conditions for which antimicrobial therapy could be curtailed without compromising patient care.

1. OTITIS MEDIA

The recommendations apply only to the otherwise healthy patients from 2 months through 12 years of age or older with uncomplicated AOM, without signs or symptoms of systemic illness unrelated to the middle ear or without underlying conditions that may alter the natural course of AOM. These conditions include, but are not limited to, anatomic abnormalities such as cleft palate, genetic conditions such as Down syndrome, immunodeficiencies and the presence of cochlear implants. Also excluded are children with a clinical recurrence of AOM within 30 days or AOM with underlying chronic otitis media with effusion (OME).

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PRINCIPLES

1. Episodes of otitis media should be classified as acute otitis media (AOM) or otitis media with effusion (OME).
2. Antibiotics are indicated for treatment of AOM; however, diagnosis requires documented middle ear effusion *and* signs or symptoms of acute local or systemic illness.
3. Uncomplicated AOM may be treated with a 5- to 7-day course of antibiotics in certain patients (e.g. in most children 2 years of age or older). A narrow-spectrum antimicrobial agent (e.g. amoxicillin) should be used for initial episodes of acute otitis media.
4. Persistent middle ear effusion (OME) for 2 to 3 months after therapy for AOM is expected and does not require retreatment.
5. Antibiotics are not indicated for initial treatment of OME; treatment may be indicated if effusions persist for 3 months or more.
6. Antimicrobial prophylaxis should be reserved for control of recurrent AOM, defined as 3 or more distinct and well-documented episodes in 6 months or 4 or more episodes in 12 months.

Otitis Media-Principles of Judicious Use of Antimicrobial Agents; Scott F. Dowell, MD, MPH; S. Michael Marcy, MD; William R. Phillips, MD, MPH; Michael A. Gerber, MD; and Benjamin Schwartz, MD; *Pediatrics*, 1998; 101, Supplement; p.165-171

1-1. ACUTE OTITIS MEDIA (AOM)

DEFINITION

AOM is defined as the recent, abrupt onset (within 48 hours) of middle ear effusion accompanied by signs or symptoms of inflammation of the middle ear. *Each of the three criteria of this definition — (1) recent, abrupt onset; (2) presence of middle ear effusion; and (3) presence of middle ear inflammation—is necessary to establish the diagnosis.* It is often disregarded that middle ear effusion is a sine qua non: without it there can be no diagnosis of AOM. A red tympanic membrane is not enough. Accompanying signs and symptoms may be specific for AOM, such as otalgia or otorrhea; or nonspecific, such as fever (Table 1).

New Guidelines On Acute Otitis Media: An Overview Of Their Key Principles For Practice
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TABLE 1. Definition of AOM

A diagnosis of AOM requires:

- 1) the history of *acute onset* of signs and symptoms,
- 2) the presence of middle – ear *effusion* (MEE), and
- 3) signs and symptoms of middle-ear *inflammation*.

Elements of the definition of AOM are all of the following:

1. *Recent, usually abrupt, onset of signs and symptoms of middle-ear inflammation and MEE.*
2. *The presence of MEE that is indicated by any of the following:*
 - a. Bulging of the tympanic membrane
 - b. Limited or absent mobility of the tympanic membrane
 - c. Air-fluid level behind the tympanic membrane
 - d. Otorrhea
3. *Signs or symptoms of middle-ear inflammation as indicated by:*
 - a. Distinct erythema of the tympanic membraneor
 - b. Distinct otalgia (discomfort clearly referable to the ear[s] that results in interference with or precludes normal activity or sleep).

PEDIATRICS Vol. 113 No. 5 May 2004 1451

DIAGNOSIS

The **diagnosis** of AOM can be suspected clinically when the signs and symptoms of an upper respiratory tract infection (URTI), which frequently precedes AOM by 3 to 5 days, are accompanied by ear pain, irritability, or pulling at the ear. It is important to note, however, that pulling at the ear is an unreliable sign, as no more than 10% of children who pull at the ear actually have AOM. Fever is generally less than 40° C, and one third of children with AOM who present in the physician's office have no fever at all. Purulent drainage is, of course, diagnostic.

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In addition to clinical signs and symptoms, certain technical aids can assist in the diagnosis of AOM: **tympanocentesis, tympanography, reflectometry, and pneumatic otoscopy.**

MEE also can be demonstrated directly by tympanocentesis or the presence of fluid in the external auditory canal as a result of tympanic membrane perforation. The presence of MEE is commonly confirmed with the use of *pneumatic otoscopy* but can be supplemented by *tympanometry and/or acoustic reflectometry*. Visualization of the tympanic membrane with identification of an MEE and inflammatory changes is necessary to establish the diagnosis with certainty.

Tympanocentesis is indicated when rapid bacteriologic diagnosis and antimicrobial susceptibility are necessary. This includes the treatment of children with underlying immune deficits, such as those receiving chemotherapy; children with mastoiditis, meningitis, or other intracranial complications; and children in whom two or three sequential courses of appropriate antimicrobial therapy have failed.

Tympanography is quite valuable in defining the presence of middle ear effusion, which is an absolute prerequisite for the diagnosis of AOM. However, tympanography may be difficult to perform, particularly in a young febrile or otherwise uncooperative child. Obtaining a seal is often quite difficult, if not impossible, especially in children younger than 6 months of age.

Acoustic reflectometry has been advocated as a simpler way of establishing the presence of middle ear fluid. In contrast to tympanography, it does not require a seal and can also be performed through even a small opening in the cerumen in the external auditory canal. Acoustic reflectometry is a very useful diagnostic method and should become increasingly available over the next few years as it is improved and distributed more widely.

Pneumatic otoscopy is the most practical diagnostic modality for AOM. The pneumatic otoscope should be checked to assure that the bulb is current and the light is bright and white in color. If a yellow or orange bulb is used, the tympanic membrane will appear inflamed. The otoscope should be checked regularly to assure that there is an appropriate pressure to move the tympanic membrane when it is pumped, that a tight seal can be applied and that appropriate speculi are used to obtain a good seal in the external auditory canal. It is imperative that the position of the tympanic membrane and its mobility both be described when attempt is made to establish a diagnosis of AOM.

Certain findings that highly correlate with AOM are:

- A bulging tympanic membrane had a positive predictive value of 83% to 99%;
- Distinctly impaired mobility in the presence of tympanic membrane fullness or bulging had a positive predictive value of 85% to 99%;
- Redness of the tympanic membrane alone, without other findings, had a predictive value as low as 7%.

This demonstrates that the old paradigm, “*Chief complaint: earache; physical examination: red tympanic membrane; Rx: amoxicillin,*” is simply no longer adequate or acceptable.

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TREATMENT

The management of AOM should include an assessment of pain. **If pain is present, the clinician should recommend treatment to reduce pain.** The management of pain, especially during the first 24 hours of an episode of AOM, should be addressed regardless of the use of antibacterial agents.

The treatment of pain in AOM should be selected based on a consideration of benefits and risks and, whenever possible, incorporate parent/caregiver and patient preferences (Table 2):

TABLE 2. Treatment of Ootalgia in AOM

Modality	Comments
<i>Acetaminophen, ibuprofen</i>	Effective analgesia for mild to moderate pain, readily available, mainstay of pain management for AOM.
<i>Home remedies</i>	May have limited effectiveness (no controlled studies that directly address effectiveness).
<i>Distraction</i>	Have stood the test of time and offer little or no risk (no controlled studies that directly address effectiveness).
<i>External application of heat or cold</i>	Have stood the test of time and offer little or no risk (no controlled studies that directly address effectiveness).
<i>Oil</i>	Warm oil may only be put in the ear canal if otorrhea is absent.
<i>Topical agents (Auralgan, Americaine Otic)</i>	Additional but brief benefit over acetaminophen in patients > 5 years old.
<i>Naturopathic agents (Oticon Otic Solution)</i>	Comparable with amecocaine/phenazone in patients > 6 years old.
<i>Homeopathic agents</i>	No controlled studies that directly address effectiveness.
<i>Narcotic analgesia with codeine or analogs</i>	Effective for moderate or severe pain; requires prescription; risk of respiratory depression, altered mental status, gastrointestinal upset or constipation.
<i>Tympanostomy/myringotomy</i>	Can be used for the child who is in extreme pain, as it provides almost immediate relief. Requires skill and entails potential risk.

Antimicrobial agents are indicated for the treatment of AOM. The benefit of antimicrobial treatment is most apparent when pathogenic bacteria are isolated from middle ear fluid, when bacterial eradication is used to assess outcome, or when clinical outcome was assessed at 2 to 3 days, rather than 7 to 14 days. In certain patients uncomplicated AOM may be treated with a 5- to 7-day course of antimicrobials.

Observation without use of antibacterial agents in a child with uncomplicated AOM is an option for selected children. This option is based on diagnostic certainty, age, illness severity, and assurance of follow-up.

It should be limited to otherwise healthy children 6 months to 2 years of age with nonsevere illness at presentation *and* an uncertain diagnosis *and* to children 2 years of age and older without severe symptoms at presentation *or* with an uncertain diagnosis. In these situations, observation provides an opportunity for the patient to improve without antibacterial treatment (Table 3).

TABLE 3. Criteria for Initial Antibacterial Treatment or Observation in Children With AOM

Age	Certain Diagnosis	Uncertain Diagnosis
<6 months	Antibacterial therapy.	Antibacterial Therapy
6 to 24 months	Antibacterial therapy.	Antibacterial therapy if severe illness. Observation option* if nonsevere illness.
> 24 months	Antibacterial therapy if severe illness. Observation option* if nonsevere illness.	Observation option*

*The “observation option” for AOM refers to deferring antibacterial treatment of selected children for 48 to 72 hours and limiting management to symptomatic relief. The decision should be based on the child’s age, diagnostic certainty, and illness severity.

Important:

the parent/caregiver must have readily available means of communicating with the clinician, there must be a system that permits reevaluation, the parent/caregiver must be able to obtain medication conveniently, if necessary.

Pediatrics, Vol. 113, No. 5, May 2004, 1451

“Severe” illness is defined as illness in which the child’s temperature is 39 °C or higher *or* there is moderate or severe otalgia. Children with mild ear pain *and* a temperature less than 39°C are considered to have “nonsevere” illness.

If the decision is made to treat with an antibiotic, amoxicillin remains the initial antibiotic of choice for most children. It is not only effective but also has a low incidence of side effects, is cost-effective, and, by virtue of its taste, helps to assure good compliance. High-dose amoxicillin (80 to 90 mg/kg/day) is to be given in two divided doses for 5 to 10 days, depending on patient age. It is recommended that short-course amoxicillin therapy be limited to children 6 years of age or older, for whom 5 to 7 days may be sufficient.

Children who have uncertain allergy to beta-lactams or nonanaphylactic allergy are advised to take an oral cephalosporin, such as cefdinir, cefuroxime, or cefpodoxime. Children with a history of anaphylaxis or severe allergy to beta-lactams warrant treatment with one of the following: azithromycin, clarithromycin, trimethoprim-sulfamethoxazole or erythromycin-sulfisoxazole.

For children who are vomiting or for whom compliance cannot be assured, ceftriaxone 50 mg/kg given as a single intramuscular dose can be considered appropriate therapy. In such cases, no additional oral therapy is required and, if conjunctivitis is present, no additional ocular therapy is required.

Lack of response within 48 to 72 hours requires reassessment to confirm AOM. If confirmed in a child initially managed with observation option, an antibiotic should be prescribed. If initial management was with an antibiotic, an alternative antibiotic should be prescribed (Table 4).

Table 4: Suggested antimicrobial therapy for AOM

<ul style="list-style-type: none">• Amoxicillin 80 to 90 mg/kg/day in two divided doses for 5 to 10 days, depending on patient age.• For patients with non-type I or uncertain allergy to beta-lactams: <i>cefdinir, cefuroxime or cefpodoxime.</i>• For patients with anaphylaxis or severe allergy to beta-lactams: <i>azithromycin, clarithromycin, trimethoprim/sulfamethoxazole, erythromycin/sulfisoxazole.</i>• For patients with vomiting or uncertain compliance: <i>ceftriaxone 50 mg/kg intramuscularly.</i>• For patients who do not respond to initial management at 48 to 72 hours: <i>amoxicillin-clavulanate 90 mg/kg/day in two divided doses (to 4 g).*</i> <i>or</i> <i>cefdinir, cefuroxime, or cefpodoxime,</i> <i>or</i> <i>ceftriaxone 50 mg/kg intramuscularly or intravenously, three daily doses.</i>

*Can be primary therapy for children with moderate to severe otalgia or fever 39 °C.
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Further failure may require *tympanocentesis* or *cautious use of clindamycin*. If tympanocentesis is not available (or while the results of susceptibility studies are awaited), use of clindamycin should be considered. **Overuse of clindamycin clearly will reduce its utility in the future, so it is strongly recommended to restrict its use only to children who do not respond to second-line therapy.**

Persistent middle ear effusion after therapy for AOM is expected and does not require retreatment.

1-2. OTITIS MEDIA WITH EFFUSION (OME)

About 90% of children have OME at some time before school age, most often between ages 6 months and 4 years. In the first year of life, 50% of children will experience OME, increasing to 60% by 2 years.

DEFINITION

Otitis media with effusion (OME) is defined as the presence of fluid in the middle ear without signs or symptoms of acute otitis media (AOM).

According to AHCPR panel definition *a patient with OME* is a child between 1 and 3 years of age with effusion present 6 weeks after an acute episode of otitis media, with no apparent symptoms, and with no underlying medical condition.

OME is often asymptomatic, and earache is relatively uncommon. OME may develop either as a consequence to an episode of AOM which is slow to clear or spontaneously because of poor functioning of the eustachian tube.

Persistent middle-ear fluid from OME may result in decreased mobility of the tympanic membrane and serve as a barrier to sound conduction. The presence of OME is of clinical concern because decreased mobility of the tympanic membrane necessarily leads to hearing loss. This temporary hearing impairment may contribute to speech and/or language delay or other developmental delays.

Some children with OME do not have significant hearing loss, particularly when OME is unilateral. Hence, documenting hearing before the intervention is important.

DIAGNOSIS

The diagnosis of middle ear pathology and the ability to distinguish between AOM and OME, especially in children, can be difficult. Most children have middle ear effusions at some time during childhood but these are transient in the majority and often asymptomatic. Therefore, health care practitioners should have an increased awareness of possibility of the presence of OME in asymptomatic children.

Pneumatic otoscopy should be used as the primary diagnostic method for OME. Non-pneumatic otoscopy is not recommended for the primary diagnosis of OME. When the diagnosis is doubtful, *tympanometry* or *acoustic reflectometry* can be used in addition to pneumatic otoscopy.

OME is diagnosed if there is a *middle ear effusion (MEE) on pneumatic otoscopy with no signs of acute inflammation.* Evidence of middle ear effusion is confirmed by the presence of either:

- at least two tympanic membrane abnormalities (abnormal color such as yellow, amber or blue; opacification other than due to scarring; decreased or absent tympanic membrane mobility)
- otoscopy typically showing a retracted/concave tympanic membrane with a color change (typically yellow or amber). Air bubbles or an air/fluid level may be

present and, while not typical, fullness or bulging may be visualized. Pneumotoscopy will demonstrate reduced or absent mobility.

Typically, the main symptom associated with OME is *hearing loss* (which is often not identified in infants and young children). Diagnostic features which can help to distinguish OME from AOM are presented below (Table 5):

Table 5: Diagnostic features of OME and AOM

	Earache Fever Irritability	Middle Ear Effusion (MEE)	Opaque Drum	Bulging Drum	Impaired Drum Mobility	Hearing Loss
OME	Typically absent	Present	May be absent	Typically absent	Present	Typically present
AOM	Present	Present	Present	May be present	Present	Present

TREATMENT

Any intervention for OME (medical or surgical) other than observation carries some inherent harm.

Many episodes of OME resolve spontaneously within 3 months, but 30% to 40% of children have recurrent OME, and 5% to 10% of episodes last 1 year or longer.

Approximately 65% of all cases of OME will resolve within 3 months without antibiotic therapy, as will 90% of the subset of OME that immediately follows a diagnosed episode of AOM. Therapy for OME is appropriate only if persistent and clinically significant benefits can be achieved beyond spontaneous resolution. Many experts recommend that *middle ear effusion in the absence of AOM should not be treated with antimicrobials at all.*

For initial treatment of OME either of two options with similar long-term outcomes are recommended:

- observation with no antibacterial therapy
- antibiotic therapy.

Observation without antibiotic therapy now is considered to be the preferred option. The patient with OME who is not at risk with a specified period of observation for speech, language, or learning problems should be managed with watchful waiting for 3 months from the date of effusion onset (if known) or diagnosis (if onset is unknown).

Children with documented OME should be followed monthly to document the persistence of MEE until clear. In many cases, it is difficult to know how long OME has been present. Thus, children with otitis media with effusion and documented language delays, school or behavior problems, and/or chronic medical conditions, should be referred promptly for audiologic evaluation regardless of the known duration of OME. If conductive hearing loss is found, otolaryngology referral is appropriate to consider management options. For children with uncomplicated OME, referral is appropriate when effusion has been present for 3-4 months.

A single course of high-dose amoxicillin/clavulanate is appropriate for OME that has been present 2-3 months.

Antihistamines and decongestants are ineffective for OME and are not recommended for treatment; antimicrobials and corticosteroids do not have long-term efficacy and are not routinely recommended.

When a surgical intervention is required, *tympanostomy tube insertion* is the preferred initial procedure; adenoidectomy should not be performed unless a distinct indication exists (nasal obstruction, chronic adenoiditis). Repeat surgery consists of adenoidectomy plus myringotomy, with or without tube insertion. Tonsillectomy alone or myringotomy alone should not be used to treat OME.

GENERAL PRINCIPLES OF OME MANAGEMENT

Follow-up and monitoring of the presence or resolution of middle ear effusion (MEE) is the basis of OME successful treatment. This monitoring is important for the early identification of the child at risk for developmental difficulties and for the appropriate timing for referral of the child with persistent OME. Principles of OME appropriate management are presented below:

1. Observation without antibiotics should be the first line management option for at least 3 months for the patient with OME.
2. All patients with OME who have a positive assessment for pain should be treated with an appropriate analgesic, though ear pain in OME is not common.
3. No medication should be given to otherwise healthy patient with persistent OME.
4. The patient with OME who is at risk for developmental difficulties should be aggressively managed as appropriate to his/her condition. This individualized management may include:
 - earlier referral for audiologic evaluation,
 - shorter intervals between visits,
 - antibiotic therapy,
 - referral for speech/language assessment,
 - referral for pressure-equalizing (PE) tubes,
 - referral for other otolaryngological evaluation.
5. Otherwise healthy patient with OME should be evaluated at 1-2 months after diagnosis and then again at 3 months after diagnosis, or until either spontaneous, medical or surgical resolution of the effusion is achieved or until basis for a referral is identified.

6. Other therapies such as systemic steroids, antihistamines, decongestants, complementary and alternative treatments should **not** be used in the treatment of OME.

OTITIS MEDIA IN ADULTS

The antibiotic guidelines regarding children can generally be applied to adults. Smoking should be discouraged as a risk factor for any respiratory infection and AOM in particular. Oral or nasal steroids might be an appropriate option for adults with persistent MEE, particularly when associated with chronic nasal allergies. Decongestants can be considered for rare instances(e.g., airplan flights), but in general are not considered useful. Antihistamines should be reserved for patients with allergic symptoms.

Any adult with a persistent (greater than 2 month) history of unilateral MEE should be evaluated for the presence of an underlying tumor of the nasopharynx or skull base. Otitis media in adults associated with a neck mass, difficulty swallowing, hoarseness, weight loss, double vision, vision loss, facial numbness, or other signs of cranial nerve dysfunction, should be considered to be caused by a skull base neoplasm until proven otherwise.

PREVENTION OF OTITIS MEDIA

The benefit of any form of prophylactic therapy must be weighed against the risk of promoting antibiotic resistance.

Antibiotic prophylaxis should be reserved for control of recurrent AOM. The efficacy of continuous prophylactic antimicrobials for the control of recurrent AOM is well-established, although the decrease in frequency of recurrent episodes is small. Nevertheless, because of the potential consequences of emergence of additional antibacterial resistant bacteria antibiotic prophylaxis for AOM should be avoided whenever possible.

The most consistent criterion for prophylaxis is **3 or more** distinct and well-documented episodes of AOM in the preceding 6 months or **4 episodes** in the preceding year. Patients at high risk for severe or recurrent disease who are most likely to benefit from prophylaxis include those of 2 years of age, those in out-of-home child care and Native American children.

When initiated, the duration of prophylactic therapy should be no more than 6 months, because longer courses are less effective and may be more likely to promote colonization with resistant bacteria.

It is important to encourage the prevention of otitis media *through reduction of risk factors* by using the following strategies:

- Breast-feeding promotion versus bottle-feeding.
- Elimination of supine bottle-feeding.
- Discontinuation of pacifier use (consider xylitol syrup or xylitol-containing chewing gum for children with recurrent AOM, depending on age).
- Elimination of exposure of the child to tobacco smoke.

- Reconsideration of group day care activities (e.g., it may be ideal for the parents to seek smaller group for the child or eliminate day care entirely).
- Vaccinations with influenza and pneumococcal conjugate vaccines.
- Investigation of the child for atopy and immunodeficiency.

Influenza vaccination can reduce the overall incidence of AOM in children by approximately 30% during the influenza season. Use of pneumococcal conjugate vaccine will reduce both the incidence of recurrent AOM (i.e., five cases or more) and the incidence of the need for tympanostomy tubes by 20% to 25% annually.

2. ACUTE SINUSITIS (RHINOSINUSITIS)

Acute sinusitis is one of the most common community-acquired infections. It was estimated that about 1 billion episodes (viral, bacterial, or other) occur each year in the US population. On average, adults have two or three colds a year and children have 6 to 10 colds a year, of which only 0.5% to 2% are complicated by acute bacterial sinusitis; yet antibiotics are prescribed for 50% or more of cases. According to data from the National Ambulatory Medical Care Survey, sinusitis is the fifth most common diagnosis for which an antibiotic is prescribed.

PRINCIPLES

1. Most cases of acute rhinosinusitis diagnosed in ambulatory care are caused by uncomplicated viral upper respiratory tract infections. The majority of viral infections of the upper respiratory tract (URTI) involve the nose and the paranasal sinuses (*viral rhinosinusitis*).
2. Bacterial and viral rhinosinusitis are difficult to differentiate on clinical grounds. Clinical diagnosis of *bacterial sinusitis* requires:
 - nasal discharge and daytime cough without improvement for 10 to 14 days,or
 - more severe signs and symptoms of acute sinusitis (i.e. fever of 39°C [102°F], facial swelling, facial pain).
3. The common cold is a *rhinosinusitis* that often includes radiologic evidence of sinus involvement. Hence, sinus radiography is not recommended for diagnosis in routine cases. It should be used only in selected circumstances and should be interpreted with caution. Radiographs may be indicated when episodes of sinusitis are recurrent or when complications are suspected.
4. Acute rhinosinusitis resolves without antibiotic treatment in most cases. Antibiotic therapy should be reserved for patients with moderately severe symptoms and for those with severe rhinosinusitis symptoms—especially those with unilateral facial pain—regardless of duration of illness.
5. Initial antimicrobial treatment of acute sinusitis should be with an agent with the narrowest spectrum that is active against the likely pathogens.

Acute Sinusitis—Principles of Judicious Use of Antimicrobial Agents; Katherine L. O'Brien, MD; Scott F. Dowell, MD, MPH; Benjamin Schwartz, MD; S. Michael Marcy, MD; William R. Phillips, MD, MPH; Michael A. Gerber, MD; Pediatrics, Jan 1998; 101: 174 – 177

Principles of Appropriate Antibiotic Use for Acute Rhinosinusitis in Adults: Background; John M. Hickner, MD, MSc; John G. Bartlett, MD; Richard E. Besser, MD; Ralph Gonzales, MD, MSPH; Jerome R. Hoffman, MA, MD; Merle A. Sande, MD; 20 March 2001, *Annals of Internal Medicine* Volume 134, Number 6 Part 2; p.p.498-505.

DEFINITION

The term *sinusitis* refers to an inflammation of the paranasal sinuses mucosa, regardless of cause. The more accurate term for what was once simply *sinusitis* is *rhinosinusitis*, because sinusitis rarely happen without concurrent rhinitis (i.e. inflammation of the

contiguous nasal mucosa), and computed tomography (CT) shows that almost 90% of patients with the common cold have radiographic evidence of sinus disease.

Bacterial rhinosinusitis may develop when inflammatory rhinosinusitis is infected with overgrown colonizing respiratory flora because of insufficient sinus drainage or normal ciliary clearance. In children, bacterial rhinosinusitis usually follows upper respiratory tract viral infection (URTI) or allergic rhinitis. Rhinorrhea must exist for a minimum time before bacterial rhinosinusitis is considered to have developed after a common cold. This minimal period of time is 7 days if the rhinorrhea is related to localizing sinus inflammation signs, and 10 to 14 days if it is mostly an isolated symptom.

Based on the symptom duration the types of sinusitis are classified as:

- *Acute bacterial sinusitis*: Bacterial infection of the paranasal sinuses lasting less than 30 days in which symptoms resolve completely.
- *Subacute bacterial sinusitis*: Bacterial infection of the paranasal sinuses lasting between 30 and 90 days in which symptoms resolve completely.
- *Recurrent acute bacterial sinusitis*: Episodes of bacterial infection of the paranasal sinuses, each lasting less than 30 days and separated by intervals of at least 10 days during which the patient is asymptomatic.
- *Chronic sinusitis*: Episodes of inflammation of the paranasal sinuses lasting more than 90 days. Patients have persistent residual respiratory symptoms such as cough, rhinorrhea or nasal obstruction.
- *Acute bacterial sinusitis superimposed on chronic sinusitis*: Patients with residual respiratory symptoms develop new respiratory symptoms. When treated with antimicrobials, these new symptoms resolve, but the underlying residual symptoms do not.

Table 6: Definition of Bacterial Sinusitis/Rhinosinusitis*

	Symptom Duration	Clinical Progress/Aspects
Acute	< 30 days	Symptoms resolve completely.
Subacute	30 - 90 days	Symptoms resolve completely.
Recurrent	Episodes lasting < 30 days, separated by at least 10 day intervals	During intervals of at least 10 day the patient is asymptomatic.
Chronic	Episodes lasting > 90 days	Persistent residual respiratory symptoms: cough, rhinorrhea, nasal obstruction.
Acute superimposed on chronic sinusitis	Patients with residual respiratory symptoms (chronic sinusitis) develop new respiratory symptoms.	New symptoms resolve, but the underlying residual symptoms remain.

*In children, bacterial rhinosinusitis usually follows viral upper respiratory tract infection (URTI) or allergic rhinitis.

Several other predisposing factors for sinusitis are anatomic variation (e.g. adenoidal hypertrophy, polyps), barotrauma (e.g. resulting from swimming), dental infection, exposure to irritants (e.g. smoke), hormonal changes, immunocompromised status.

DIAGNOSIS

Clinical diagnosis of sinusitis is difficult because of overlapping symptoms of rhinitis and sinusitis. Symptoms in children are different from and more nonspecific than those in adults.

Under normal circumstances the paranasal sinuses are assumed to be sterile. The diagnosis of acute bacterial sinusitis is based on clinical criteria in patients who present with upper respiratory symptoms that are either **persistent** or **severe**. The persistence of respiratory symptoms without any evidence that they are beginning to resolve suggests the presence of a secondary bacterial infection.

Persistent symptoms are those that last longer than 10 to 14, but less than 30, days. Such symptoms include nasal or postnasal discharge (of any quality), daytime cough (which may be worse at night), or both. Patients with rhinorrhea or cough that is improving by day 10 of illness are likely to have an uncomplicated viral URTI. Additionally, rhinorrhea does not predict acute bacterial rhinosinusitis because change of nasal discharge color from the initial clear discharge to more purulent drainage actually coincides with the migration of leukocytes into nasal secretions and occurs during the natural course of viral upper respiratory tract infections.

Severe symptoms include a temperature of at least 102°F (39°C) and purulent nasal discharge present concurrently for at least 3 to 4 consecutive days in a patient who seems ill. The child who seems toxic should be hospitalized.

Clinical diagnosis of bacterial sinusitis requires the following:

1) prolonged nonspecific upper respiratory signs and symptoms (i.e. rhinosinusitis and cough without improvement for >10 to 14days)

or

2) more severe upper respiratory tract signs and symptoms (i.e. fever >39°C, facial swelling, facial pain).

Therefore, the suspicion of sinusitis is reasonable when a patient has a cold that has persisted for longer than a week and is accompanied by:

- fever,
- nasal congestion or the subjective sensation of facial fullness,
- sinus discomfort,
- maxillary or periorbital swelling,
- maxillary toothache,
- hyposmia or anosmia,
- purulent nasal discharge,
- headache or unilateral facial or maxillary pain exacerbated by bending forward,
- a biphasic illness.

Accurate diagnosis of bacterial sinusitis is unreliable without the "gold standard" of needle aspiration of sinus contents with its further microbiological assessment (culturing) or surgery.

Current diagnostic reference standard which confirms bacterial rhinosinusitis is sinus contents that upon bacterial culture yield >10000 colony-forming units per milliliter of aspirate.

Culture of nasal discharge or the nasopharynx does not have predictive reliability, both for establishing the diagnosis of bacterial rhinosinusitis and for identifying the infective pathogen. At best, culturing nasal discharge and the oropharynx provides useful information on assessing the frequency of antibiotic resistance in respiratory flora for population studies but is diagnostically unreliable for establishing the cause of bacterial rhinosinusitis in individual patients.

Radiographic studies are not recommended for routine diagnosis of uncomplicated acute sinusitis in primary care. Radiographic evaluation should be restricted to patients in whom the diagnosis of rhinosinusitis is uncertain or for assessment in anticipation of endoscopic sinus surgery, including aspiration. Therefore, these patients include those

- who have evidence of an intracranial or intraorbital complication of sinusitis;
- who fail to respond to a full course of treatment with an appropriate antimicrobial agent;
- who has recurrent or chronic sinusitis.

In these special circumstances, CT is the evaluation of choice.

Acute sinusitis: When--and when not--to prescribe antibiotics; James E. Leggett, MD; Vol. 115 / no 1 / January 2004 / Postgraduate Medicine http://www.postgradmed.com/issues/2004/01_04/leggett.htm

TREATMENT

As with acute otitis media, acute sinusitis often will resolve even without antimicrobial therapy.

Symptom relief should be a major concern of therapy for acute sinusitis, and patience - an integral part of management. Only patients with a high probability of having bacterial sinusitis should be considered for antibiotic treatment.

Antibiotics are recommended for the management of acute bacterial sinusitis to achieve more rapid clinical cure. To ensure the judicious use of antibiotics, it is essential that children diagnosed as having acute bacterial sinusitis meet the defining clinical presentations of "persistent" or "severe" disease as described previously. This will minimize the number of children with uncomplicated viral upper respiratory tract infections who are treated with antimicrobials.

In the absence of any risk factors, approximately 80% of children with acute bacterial sinusitis will respond to treatment with amoxicillin (Table 7). Risk factors for the presence of bacterial species that are likely to be resistant to amoxicillin include:

- 1) attendance at day care,
- 2) recent receipt (< 90 days) of antimicrobial treatment,
- 3) age less than 2 years.

Table 7: Suggested antimicrobial treatment of Acute Bacterial Sinusitis in Children

<p><i>Amoxicillin</i> at an usual dose of 45 mg/kg/d in 2 divided doses or at a high dose of 90 mg/kg/d in 2 divided doses <i>for 10-14 days depending on patient's age.</i></p> <p>If the patient is allergic to amoxicillin (only if the allergic reaction was not a type 1 hypersensitivity reaction):</p> <p><i>cefdinir</i> (14 mg/kg/d in 1 or 2 doses), or <i>cefuroxime</i> (30 mg/kg/d in 2 divided doses), or <i>cefpodoxime</i> (10 mg/kg/d once daily)</p> <p>In cases of serious allergic reactions:</p> <p><i>clarithromycin</i> (15 mg/kg/d in 2 divided doses) or <i>azithromycin</i> (10 mg/kg/d on day 1, then - 5 mg/kg/d 3- 4 days as a single daily dose)</p>
--

- can be an initial treatment for children < 2 years of age without risk factors and with uncomplicated mild to moderate acute bacterial sinusitis.

If patients do not improve within 48–72 hours while receiving the usual dose of amoxicillin (45 mg/kg/d), have recently been treated with an antimicrobial, have an illness that is moderate or more severe, or attend day care, therapy should be initiated with high-dose amoxicillin-clavulanate (80–90 mg/kg/d of amoxicillin component, with 6.4 mg/kg/d of clavulanate in 2 divided doses).

Clindamycin (at 30 to 40 mg/kg/d in 3 divided doses) can be used under certain circumstances as an alternative therapy in the penicillin-allergic patients who are known to be infected with a penicillin-resistant *S. pneumoniae*.

Children with complications or suspected complications of acute bacterial sinusitis should be treated promptly and aggressively. This should include referral to an otolaryngologist usually with the consultation of an infectious disease specialist, ophthalmologist and neurosurgeon.

Serious complications of acute bacterial rhinosinusitis, such as meningitis, brain abscess, and periorbital cellulitis, are rare. Patients with uncomplicated acute sinusitis seldom need to be hospitalized. However, complications arising from spread of infection into the periorbital space or the central nervous system should prompt urgent hospitalization. Although rare, they can result in permanent blindness or death if not treated promptly and appropriately. Periorbital and intraorbital inflammation and infection are the most common complications of acute sinusitis and most often are a consequence of ethmoiditis, whereas meningitis or abscess arises most commonly from frontal sinusitis. Therefore, some patients with acute bacterial rhinosinusitis may rarely present with dramatic symptoms of severe unilateral maxillary pain, swelling and fever. These patients must be treated promptly with an appropriate antibiotic and may require surgical referral for sinus drainage.

Patients who do not respond within 72 hours to proper antibiotic treatment should be referred for the further evaluation.

Mild cases of periorbital cellulitis (eyelid 50% closed) may be treated with appropriate oral antibiotic therapy as an outpatient with daily patient encounters.

However, if the patient has not improved in 24 to 48 hours or if the infection is progressing rapidly, it is appropriate to admit the patient to the hospital for antimicrobial therapy consisting of intravenous ceftriaxone (100 mg/kg/d in 2 divided doses) or ampicillin-sulbactam (200 mg/kg/d in 4 divided doses). Vancomycin (60 mg/kg/d in 4 divided doses) may be added in children in whom infection is either known or likely to be caused by *S. pneumoniae* that are highly resistant to penicillin.

If proptosis, impaired visual acuity, or impaired extraocular mobility are present on examination, a CT scan (preferably coronal thin cut with contrast) of the orbits/sinuses is essential to exclude a suppurative complication. In such cases, the patient should be evaluated by an otolaryngologist and an ophthalmologist. Suppurative complications generally require prompt surgical drainage. An exception to this is the patient with a small subperiosteal abscess and minimal ocular abnormalities for whom intravenous antibiotic treatment for 24 to 48 hours is recommended while performing frequent visual and mental status checks.

Patients who have changes in visual acuity or mental status or who fail to improve within 24 to 48 hours require prompt surgical intervention and drainage of the abscess. Antibiotics can be altered, if inappropriate, when results of culture and sensitivity studies become available.

In patients with altered mental status, neurosurgical consultation is indicated. Signs of increased intracranial pressure (headache and vomiting) or nuchal rigidity require immediate CT scanning (with contrast) of the brain, orbits, and sinuses to exclude intracranial complications such as cavernous sinus thrombosis, osteomyelitis of the frontal bone (Pott's puffy tumor), meningitis, subdural empyema, epidural abscess and brain abscess.

Clinical Practice Guideline: Management of Sinusitis; American Academy Of Pediatrics; Subcommittee on Management of Sinusitis and Committee on Quality Improvement; Pediatrics, Vol. 108 No. 3, September 2001

PREVENTION OF SINUSITIS/RHINOSINUSITIS

Antibiotic prophylaxis as a strategy to prevent infection in patients who experience recurrent episodes of acute bacterial sinusitis may be used **only in a few highly selected patients** whose infections have been defined scrupulously (always fulfilling criteria for persistent or severe presentation) and are very frequent (at least 3 infections in 6 months or 4 infections in 12 months). Amoxicillin (20 mg/kg/d given at night) and sulfisoxazole (75 mg/kg/d in 2 divided doses) can be prescribed to prevent episodes of the sinus disease. Usually prophylaxis is maintained until the end of the respiratory season.

The prevention of sinusitis/rhinosinusitis *through reduction of risk factors* is mostly similar to that of acute otitis. It is always appropriate to initiate an evaluation for factors that commonly predispose to episodes of recurrent acute bacterial sinusitis such as atopy, immunodeficiency, cystic fibrosis, and dysmotile cilia syndrome. Several other predisposing factors for sinusitis are anatomic variation (e.g. adenoidal hypertrophy,

polyps), barotrauma (e.g. resulting from swimming), dental infection, exposure to irritants (e.g. smoke), hormonal changes, immunocompromised status. Patients with craniofacial abnormalities also are at risk to develop acute bacterial sinusitis.

3. ACUTE PHARYNGITIS (SORE THROAT)

It is estimated that over 15 million patients visit their physician's office complaining of a sore throat each year in the United States. Approximately, 90 % of sore throats in adults and 60 to 75% of sore throats in children are caused by viral agents.

PRINCIPLES

These principles of appropriate antibiotic use apply to immunocompetent patients without complicated comorbid conditions, such as chronic lung or heart disease, and history of rheumatic fever. They do not apply during known outbreaks of group A streptococcus.

1. Diagnosis of group A streptococcal pharyngitis should be made on the basis of results of appropriate laboratory tests in conjunction with clinical and epidemiologic findings.

Group A β -hemolytic streptococcus (GABHS) is the causal agent in approximately 10% of adult cases of pharyngitis. The large majority of adults with acute pharyngitis have a self-limited illness, for which supportive care only is needed.

2. Antimicrobial therapy should not be given to a patient with pharyngitis in the absence of identified group A streptococci. Limit antibiotic prescriptions to patients who are most likely to have GABHS infection.

All patients with pharyngitis should be clinically screened for the presence of the four Centor criteria: *history of fever, tonsillar exudates, no cough, and tender anterior cervical lymphadenopathy (lymphadenitis)*. Patients with none or only one of these criteria do not require testing or antibacterial treatment. For patients with two or more criteria the following strategies are appropriate:

- a) test patients with two, three, or four criteria by using a rapid antigen test, and limit antibiotic therapy to patients with positive test results;
- b) test patients with two or three criteria by using a rapid antigen test, and limit antibiotic therapy to patients with positive test results or patients with four criteria;
- c) do not use any diagnostic tests, and limit antibiotic therapy to patients with three or four criteria.

3. Throat cultures are **not** recommended for the *routine primary evaluation* of patients with pharyngitis or for confirmation of negative results on rapid antigen tests when the test sensitivity exceeds 80%. Throat cultures may be indicated as part of investigations of outbreaks of GABHS disease, for monitoring the development and spread of antibiotic resistance, or when such pathogens as gonococcus are being considered.

4. Penicillin remains the drug of choice for treating group A streptococcal pharyngitis. In penicillin-allergic patients erythromycin can be used.

Pharyngitis—Principles of Judicious Use of Antimicrobial Agents; Benjamin Schwartz, S. Michael Marcy, William R. Phillips, Michael A. Gerber, and Scott F. Dowell; Pediatrics, Jan 1998; 101: 171 - 174.

Principles of Appropriate Antibiotic Use for Acute Pharyngitis in Adults: Background; Richelle J. Cooper, MD, MSHS; Jerome R. Hoffman, MA, MD; John G. Bartlett, MD; Richard E. Besser, MD; Ralph Gonzales, MD, MSPH; John M. Hickner, MD, MSc; and Merle A. Sande, MD; *Annals of Internal Medicine*, 2001;134:509-517.

DEFINITION

Acute pharyngitis is defined as an acute inflammation of the pharynx that frequently results in a “sore throat” (i.e. discomfort, pain or scratchiness in the throat).

Symptoms of classic streptococcal pharyngitis include:

- acute onset of pharyngeal pain,
- dysphagia,
- fever.

On examination:

- the pharynx is erythematous,
- a patchy exudate often is present on the posterior pharynx and tonsils,
- palatal petechiae may be observed,
- anterior cervical lymph nodes often are enlarged and tender.

Malaise, headache, abdominal pain, and vomiting occur commonly.

Rhinorrhea, cough, hoarseness, conjunctivitis, and diarrhea are uncommon and strongly suggest a viral etiology.

DIAGNOSIS

Because the clinical presentation of pharyngitis does not predict reliably the etiologic agent, when group A streptococcal infection is suspected, diagnosis should be based on the results of a throat swab culture or antigen-detection test with culture back-up. *Culture of a throat swab specimen is recommended as the standard for diagnosis.*

Throat cultures may be false-negative if specimens are obtained or cultured improperly. Samples should be obtained by vigorous swabbing of both tonsillar surfaces or fossae and the posterior pharynx; swabbing the soft palate and uvula should be avoided.

The most reliable clinical signs suspect GABHS pharyngitis are the Centor criteria (tonsillar exudates, tender anterior cervical lymphadenopathy or lymphadenitis, absence of cough, and history of fever).

Certain epidemiological and clinical features are characteristic and can be useful for selecting patients who require antibiotic treatment of pharyngitis due to GABHS (Table 8). However, these findings, either individually or collectively, cannot definitively predict the presence of GABHS pharyngitis. They only can identify persons with a high probability of GABHS pharyngitis (and for whom throat culture or rapid antigen detection testing is indicated) or a low probability of GABHS pharyngitis (neither culture or rapid antigen detection testing is necessary):

Table 8: Clinical and epidemiological findings useful in diagnosis of pharyngitis*
Features suggestive of GABHS as the etiologic agent:
Sudden onset
Sore throat
Fever
Headache
Nausea, vomiting, and abdominal pain
Inflammation of pharynx and tonsils
Patchy discrete exudate
Tender, enlarged anterior cervical nodes
Patient aged 5-15 years of age
Presentation in winter or early spring
History of exposure
Features suggestive of viral etiology:
Conjunctivitis
Coryza
Cough
Diarrhea

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Neal R. Chamberlain, Ph.D; Infections of The Upper Respiratory Tract – Pharyngitis;
[Http://www.kcom.edu/faculty/chamberlain/website/lectures/lecture/uriphyn.htm](http://www.kcom.edu/faculty/chamberlain/website/lectures/lecture/uriphyn.htm)

TREATMENT

If untreated, a patient with GABHS pharyngitis can develop suppurative (pus producing) and nonsuppurative (no pus is produced) complications. Suppurative complications include peritonsillar abscess, cervical lymphadenitis, and mastoiditis. The major nonsuppurative complication is *rheumatic fever*. This complication is more likely to occur in children with GABHS pharyngitis than in adults with this bacterial infection.

All patients with pharyngitis should be administered appropriate analgesics, antipyretics, and supportive care.

Antimicrobial therapy should not be given to a patient with pharyngitis in the absence of confirmed diagnosed GABHS or other bacterial infection.

On the other hand, antimicrobial treatment of patients with confirmed streptococcal pharyngitis will:

- limit contiguous spread of the GABHS infection (e.g. peritonsillar abscess, cervical lymphadenitis and mastoiditis),
- prevent development of acute rheumatic fever (if given within 9 days of symptoms appearing),

- improve clinical signs and symptoms (if given within 2 days of symptoms appearing), rapidly decrease infectivity thus reducing transmission of this bacterium to close-contacts (i.e. family members, classmates)
- allow for a rapid resumption to their usual activities.

Therefore, certain strategies for thorough selection of patients for appropriate antibiotic therapy should be exercised. The appropriate antibiotic for presumed GABHS should be one with a narrower spectrum that includes GABHS. Use of broader-spectrum agents (cephalosporins) is not recommended because excess cost of cephalosporin therapy and the greater selective pressure for antibiotic resistance are disadvantages that outweigh the small increment in group A streptococcal eradication. Penicillin is therefore the first choice for patients selected for antibiotic therapy.

10 day course of penicillin therapy results in bacteriologic and clinical cure in almost 90% of patients with group A streptococcal pharyngitis.

Erythromycin is the drug of choice for penicillin allergic patients. Use of broad-spectrum antimicrobials is discouraged. The general summary of acute GBHSA pharyngitis antibiotic treatment is presented below (Table 9):

Table 9: Antibiotic Treatment of Acute Streptococcal Pharyngitis*

Drug/Dosage	Advantage	Disadvantage
Penicillin V Potassium (PCN-VK) <ul style="list-style-type: none"> • ≤ 23 kg (≤ 50 lbs) 250 mg bid or tid x 10 days • > 23 kg (50 lbs) 500 mg bid or tid x 10 days or 250 mg bid or tid 	<ul style="list-style-type: none"> • inexpensive • narrow spectrum of antimicrobial activity • low side effect profile • bid dosing 	
Penicillin G Benzathine <ul style="list-style-type: none"> • ≤ 27 kg (60 lbs) 600,000 U IM x 1 dose • > 27 kg (60 lbs) 1,200,000 U IM x 1 dose 	<ul style="list-style-type: none"> • ensures compliance 	<ul style="list-style-type: none"> • pain at injection site • possible increased incidence of allergies with procaine • cannot discontinue drug exposure if serious allergy develops
Erythromycin <ul style="list-style-type: none"> • Estolate 20–30 mg/kg/day ÷ bid - qid x 10 days • Ethyl succinate or sterate (< 41 kg or 90 lbs) 40 mg/kg/day ÷ bid - qid x 10 days (> 41 kg or 90 lbs) 400 mg qid x 10 days 	<ul style="list-style-type: none"> • equally effective as PCN in preventing all complications of GABS • resistance is uncommon in US (< 5%) • all forms: no difference in cure rate 	<ul style="list-style-type: none"> • GI upset
Cephalexin <ul style="list-style-type: none"> • Pediatric 25–50 mg/kg/day ÷ bid x 10 days • Adults 500 mg bid x 10 days 	<ul style="list-style-type: none"> • equal cure rate vs oral PCN • bid dosing 	<ul style="list-style-type: none"> • broader spectrum
Clindamycin <ul style="list-style-type: none"> • Pediatric 20 mg/kg/day ÷ tid x 10 days) • Adults 450 mg/day ÷ tid x 10 days 	<ul style="list-style-type: none"> • unaffected by beta lactamase • narrow spectrum • eradicates carrier status 	<ul style="list-style-type: none"> • expensive • pseudomembranous colitis may occur up to several weeks after cessation of therapy • Stevens-Johnson syndrome

*Health Care Guideline: Acute Pharyngitis; Institute for Clinical Systems Improvement; Fifth Edition May 2003; www.icsi.org

PREVENTION OF PHARYNGITIS (SORE THROAT)

Carriers are at very low risk for developing acute rheumatic fever and transmitting infection and normally do not need treatment.

Persons having recovered from rheumatic fever must be protected from another "strep throat" infection due to the high recurrence of rheumatic fever in these patients. Prophylaxis of these patients with a monthly dose of penicillin is very useful. This prophylaxis should continue through the patient's childhood years. If permanent damage occurs to the heart, prophylaxis should continue for the life of the patient.

4. COUGH ILLNESS/BRONCHITIS

PRINCIPLES

The following principles apply to immunocompetent patients without complicating comorbid conditions, such as chronic lung or heart disease.

1. Routine antibiotic treatment of uncomplicated acute bronchitis is not recommended, regardless of duration of cough
2. Empiric antimicrobial therapy should be avoided in the initial management of a prolonged cough; rather, a specific diagnosis should be sought:
 - a. The evaluation of patients with a presumptive diagnosis of uncomplicated acute bronchitis should focus on ruling out serious illness such as bronchopulmonary dysplasia, lung hypoplasia, ciliary dyskinesia, chronic aspiration and, particularly, pneumonia.
 - b. Patients with markedly prolonged cough (4 to 8 weeks) should be investigated for possibly treatable causes, including reactive airway disease, tuberculosis, foreign body aspiration, pertussis, cystic fibrosis, or sinusitis.
3. Antimicrobial treatment for prolonged cough (>10 days) may be indicated in certain conditions, including *Bordetella pertussis* and *Mycoplasma pneumoniae* infections, and appropriate diagnostic studies for these infections should be obtained. Children with underlying chronic pulmonary disease other than asthma (e.g., cystic fibrosis) may benefit from antimicrobial therapy for acute exacerbations.

Cough Illness/Bronchitis - Principles of Judicious Use of Antimicrobial Agents; Katherine L. O'Brien, Scott F. Dowell, Benjamin Schwartz, S. Michael Marcy, William R. Phillips, and Michael A. Gerber; Pediatrics, Jan 1998; 101: 178 - 181.

Principles of Appropriate Antibiotic Use for Treatment of Uncomplicated Acute Bronchitis: Background; Ralph Gonzales, John G. Bartlett, Richard E. Besser, Richelle J. Cooper, John M. Hickner, Jerome R. Hoffman, and Merle A. Sande; Annals of Internal Medicine, March 2001; 134: 521 - 529.

Principles of appropriate antibiotic use for treatment of acute bronchitis in adults; Snow V, Mottur-Pilson C, Gonzales R; American Academy of Family Physicians; American College of Physicians-American Society of Internal Medicine; Centers for Disease Control; Infectious Diseases Society of America.; Ann Intern Med. 2001 Mar 20;134(6):518-520.

DEFINITION

Bronchitis is technically defined as inflammation of the bronchial respiratory mucosa, resulting in productive cough.

The clinical definition of bronchitis is not well established and there is no well-known consensus regarding nomenclature and clinical definitions of cough illnesses.

Because the pathologic definition of bronchitis as inflammation of the bronchi does not reflect the term's clinical usage, imply the need for antimicrobial therapy, or imply a specific etiology, the term *cough illness/ bronchitis* may be used. This term excludes more specific diagnoses such as pneumonia, bronchiolitis and asthma. The American

College of Chest Physicians defines acute cough illness, in contrast to chronic or persistent cough, as lasting less than 3 weeks.

This is a self-resolving illness and is most commonly caused by viral pathogens. There is ample evidence that cough illness/bronchitis in children is primarily caused by viral pathogens or, in the case of older children, sometimes by *M. pneumoniae* or *C. pneumoniae*.

DIAGNOSIS

Cough is the most commonly observed symptom of acute bronchitis. The cough begins within two days of infection in 85 percent of patients. Most patients have a cough for less than two weeks; however, 26 percent are still coughing after two weeks, and a few cough for six to eight weeks. When a patient's cough fits this general pattern, acute bronchitis should be strongly suspected.

Cough is considered to be necessary to the diagnosis of acute bronchitis. Other signs and symptoms may include sputum production, dyspnea, wheezing, chest pain, fever, hoarseness, malaise, rhonchi, and rales. Each of these may be present in varying degrees or may be absent altogether. Sputum may be clear, white, yellow, green, or even tinged with blood. Peroxidase released by the leukocytes in sputum causes the color changes; hence, color alone should not be considered indicative of bacterial infection. Accordingly, in the absence of physical signs of pneumonia, neither the production of sputum nor the character of sputum is predictive of a bacterial etiology for cough.

The physical examination of patients presenting with symptoms of acute bronchitis should focus on vital signs, including the presence or absence of fever and tachypnea, and pulmonary signs such as wheezing, rhonchi, and prolonged expiration. Evidence of consolidation must be absent. Fever may be present in some patients with acute bronchitis. However, prolonged or high-grade fever should prompt consideration of pneumonia or influenza.

Office spirometry and pulmonary function testing are not routinely used in the diagnosis of acute bronchitis. These tests are usually performed only when underlying obstructive pathology is suspected or when patients have repeated episodes of bronchitis. Pulse oximetry may play a role in determining the severity of the illness, but results do not confirm or rule out bronchitis, asthma, pneumonia, or other specific diagnoses.

Recommendations on the use of Gram staining and culture of sputum to direct therapy for acute bronchitis vary, because these tests often show no growth or only normal respiratory flora. Gram stain and culture of sputum do not reliably detect *M. pneumoniae*, *C. pneumoniae*, or *B. pertussis*. Therefore, these tests are not recommended in the evaluation of patients with uncomplicated acute bronchitis.

Neither the character nor the culture results of surrogate specimens such as sputum (defined by the presence of fewer than 10 epithelial cells per high power field) or nasopharyngeal (NP) secretions is sufficiently predictive of a bacterial infection of the bronchi to be of use in defining the need for antimicrobial therapy.

Viral pathogens such as parainfluenza virus, respiratory syncytial virus, and influenza virus account for the majority of agents identified among children with cough illness/bronchitis.

To date, only *Bordetella pertussis*, *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* have been established as nonviral causes of uncomplicated acute bronchitis in children >5 years and adults. The diagnoses are frequently based on serologic conversion or polymerase chain reaction.

Diagnosis and Management of Acute Bronchitis; Doug Knutson, M.D., Chad Braun, M.D.; Ohio State University School of Medicine and Public Health, Columbus, Ohio; American Family Physician; Volume 65, Number 10 / May 15, 2002 <http://www.aafp.org/afp/20020515/2039.html>

TREATMENT

Protussives and Antitussives

Because acute bronchitis is most often caused by a viral infection, usually only symptomatic treatment is required. When no secondary infection is present, acute bronchitis should be treated in the same way as the common cold. Treatment can focus on preventing or controlling the cough (antitussive therapy) or on making the cough more effective (protussive therapy).

Protussive therapy is indicated when coughing should be encouraged (e.g., to clear the airways of mucus).

Antitussive therapy is indicated if cough is creating significant discomfort and if suppressing the body's protective mechanism for airway clearance would not delay healing. Some selected nonspecific antitussive medications are shown in Table 10:

Table 10: Selective Nonspecific Antitussives

<i>Preparation</i>	<i>Dosage</i>	<i>Side effects</i>
Hydromorphone-guaifenesin (e.g., Hycotuss)	5 mg per 100 mg per 5 mL (one teaspoon)*	Sedation, nausea, vomiting, respiratory depression
Dextromethorphan (e.g., Delsym)	30 mg every 12 hours	Rarely, gastrointestinal upset or sedation
Hydrocodone (e.g., in Hycodan syrup or tablets)	5 mg every 4 to 6 hours	Gastrointestinal upset, nausea, drowsiness, constipation
Codeine (e.g., in Robitussin A-C)	10 to 20 mg every 4 to 6 hours	Gastrointestinal upset, nausea, drowsiness, constipation
Carbetapentane (e.g., in Rynatuss)	60 to 120 mg every 12 hours	Drowsiness, gastrointestinal upset
Benzonatate (Tessalon)	100 to 200 mg three times daily	Hypersensitivity, gastrointestinal upset, sedation

*—Doses adjusted per manufacturer's instructions.

Information from *Physicians' desk reference*. 56th ed. Montvale, N.J.: Medical Economics, 2002.

Bronchodilators

Acute bronchitis and asthma have similar symptoms. Consequently, attention has recently been given to the use of bronchodilators in patients with acute bronchitis.

In patients with uncomplicated acute bronchitis (in whom the average duration of cough is 2 to 3 weeks), preparations containing dextromethorphan or codeine probably have a modest effect on severity and duration of cough.

Other low-cost and low-risk actions, such as elimination of environmental cough triggers (for example, dust and dander) and vaporized air treatments (particularly in low-humidity environments, such as high altitude) are also reasonable options.

Antibiotics

The majority of prolonged cough illnesses are allergic, postinfectious or viral in nature. Therefore, nonspecific cough illness/bronchitis neither in children nor in adults rarely warrants antimicrobial treatment, regardless of duration of cough. If possible, empiric antimicrobial therapy should be avoided in the initial management of a prolonged cough; rather, a specific diagnosis should be sought.

The one circumstance for which antibiotic treatment may be indicated is suspicion of pertussis in patients with uncomplicated acute bronchitis.

Pertussis should be treated according to established recommendations. *Mycoplasma pneumoniae* infection may cause pneumonia and prolonged cough (usually in children >5 years of age); a macrolide agent (or tetracycline for children >8 years of age) may be

used for treatment. Patients with underlying chronic pulmonary disease (not including asthma) occasionally may benefit from antimicrobial therapy for acute exacerbations.

Reactive airway disease has been recognized recently as one of the most common causes of recurrent or prolonged cough among children.

In patients with uncomplicated acute bronchitis (in whom the average duration of cough is 2 to 3 weeks), preparations containing dextromethorphan or codeine probably have a modest effect on severity and duration of cough.

Other low-cost and low-risk actions, such as elimination of environmental cough triggers (for example, dust and dander) and vaporized air treatments (particularly in low-humidity environments, such as high altitude) are also reasonable options.

PREVENTION OF COUGH ILLNESS/BRONCHITIS

Good handwashing and respiratory hygiene are the best ways to avoid exposure to viruses and other respiratory infections.

Immunizations against certain types of pneumonia (as well as **influenza** because influenza viruses are amongst the significant causes of bronchitis) are very effective preventative measures for anyone with lung or immune system diseases.

Other preventative steps include avoiding chemical and environmental irritants, such as air pollution, and maintaining good overall health. One of the best ways to prevent bronchitis is not to begin smoking or to stop smoking.

5. THE COMMON COLD

PRINCIPLES

The following principles of appropriate antibiotic use for adults with nonspecific upper respiratory tract infections apply to immunocompetent patients without complicating comorbid chronic underlying medical conditions.

1. Antimicrobial agents should not be given for the common cold.
2. Mucopurulent rhinitis (thick, opaque, or discolored nasal discharge) frequently accompanies the common cold. It is not an indication for antimicrobial treatment unless it persists for >10 to 14 days.

DEFINITION

Upper respiratory tract infection (URI) is a nonspecific term used to describe acute infections involving the nose, the paranasal sinuses, pharynx, larynx, trachea and bronchi. The prototype is the illness known as the *common cold*.

The International Classification of Health Problems in Primary Care defines “upper respiratory tract infection” as acute inflammation of nasal or pharyngeal mucosa in the absence of other specifically defined respiratory infection.

Alternatively, the American Thoracic Society and the Medical Research Council (United Kingdom) recommend classification systems that do not include upper respiratory tract infection as an option. For example, the Medical Research Council provides the following options for classifying acute respiratory illnesses: common cold, otitis media, pharyngitis (including tonsillitis), laryngitis, croup, tracheitis, bronchitis, bronchiolitis, pneumonia and influenza.

Common cold usually includes sinus disease, and therefore *viral rhinosinusitis* can be used as a synonym for the *common cold syndrome* or *nonspecific upper respiratory tract infection (URI)*.

Rhinosinusitis and mucopurulent rhinitis are almost always caused by viral infections, for which antimicrobial use changes neither the course nor the outcome of the disease.

Acute Sinusitis - Principles of Judicious Use of Antimicrobial Agents; Katherine L. O'Brien, Scott F. Dowell, Benjamin Schwartz, S. Michael Marcy, William R. Phillips, Michael A. Gerber; Pediatrics, Vol. 101, No. 1 Supplement, January 1998, pp. 174-177
<http://pediatrics.aappublications.org/cgi/content/full/101/1/S1/174>

Principles of appropriate antibiotic use for treatment of acute respiratory tract infections in adults: background, specific aims, and methods; Gonzales R, Bartlett JG, Besser RE, Cooper RJ, Hickner JM, Hoffman JR, Sande MA.; Division of General Internal Medicine, University of Colorado Health Sciences Center, Denver, CO, USA; Annals of Internal Medicine, 2001 Mar 20;134(6):479-86
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=11255524&dopt=Abstract

Principles of appropriate antibiotic use for acute pharyngitis in adults: background; Cooper RJ, Hoffman JR, Bartlett JG, Besser RE, Gonzales R, Hickner JM, Sande MA; Centers for Disease Control and Prevention; UCLA Emergency Medicine Center, Los Angeles, California 90024, USA; Annals of

DIAGNOSIS

The agents causing the common cold identified most commonly are rhinoviruses and coronaviruses, which together account for up to 60% of infections. The etiologic agents of the common cold vary with host, age, and time of year. Each year in temperate climates, there are sequential outbreaks caused by different viruses, such as respiratory syncytial virus; influenza virus; coronavirus; rhinovirus; and parainfluenza 1, 2, and 3 viruses, interspersed with endemic infections caused by others, such as respiratory adenovirus.

The symptoms of a disease are often nonspecific and not characteristic of a specific agent. The signs and symptoms associated with the common cold also may precede or accompany focal infections that are caused by bacteria. These infections, which include otitis media and bacterial sinusitis, should be diagnosed only when specific criteria are fulfilled.

Most episodes of viral rhinosinusitis follow a predictable course. Viral rhinosinusitis begins with the inoculation of virus onto the nasal, oral, or conjunctival mucosa, followed by infection of the local respiratory epithelium. The initial symptoms, which are caused both by cellular damage and by the inflammatory response, include nasal stuffiness and throat irritation.

Within a few hours, sneezing and watery nasal discharge may occur, often accompanied by systemic complaints such as low-grade fever, malaise, headache, anorexia, and myalgias. Cough occurs in 60% to 80% of viral rhinosinusitis and does not necessarily suggest a bacterial etiology.

One to three days after the onset of illness, nasal secretions typically become thicker and more mucopurulent because they contain desquamated epithelial cells, polymorphonuclear cells and bacteria that normally colonize the upper respiratory tract. Thus, mucopurulent rhinitis is part of the natural course of viral rhinosinusitis, and there is no good evidence that children with this syndrome benefit from treatment with antimicrobials unless symptoms persist for 10 to 14 days without improvement.

The duration of illness usually ranges from 2 to 7 days. Although patients are generally improved by day 10, lingering symptoms, including cough (in up to 31% of patients) and nasal discharge (35%), can persist in children and adolescents for > 2 weeks.

Most cases of uncomplicated upper respiratory tract infections resolve spontaneously, although a small proportion becomes complicated by bacterial rhinosinusitis or bacterial pneumonia (particularly in high risk patients with influenza, such as infants, elderly persons, and chronically ill patients).

It is important to recognize as soon as possible the signs of a serious illness. The most common signs and symptoms that can help for distinguishing between URI and more serious illness are presented below (Table 11):

Table 11: Symptoms of serious illness*

Symptom/Age	<3 months	3 months – 3 years	4 years - adult
Respiratory distress	<ul style="list-style-type: none"> • Grunting • Retractions • Cyanosis • Stridor with croup symptoms not relieved by conservative measures 	<ul style="list-style-type: none"> • Retractions • Cyanosis • Marked dyspnea • Rapid respiratory rate • Shallow respirations • Difficulty swallowing • Choking • Foreign body inhalation • Stridor with croup symptoms not relieved by conservative measures 	<ul style="list-style-type: none"> • Retractions • Cyanosis • Moderate to severe dyspnea • Rapid respiratory rate • Shallow respirations • Difficulty swallowing • Choking • Foreign body inhalation • Drooling • Dysphonia • Feeling that throat is closing
Responsiveness and activity	<ul style="list-style-type: none"> • Flaccid • Lethargic • Cannot awaken or keep awake • Weak cry or weak suck • Inconsolable • Refuses feeding 	<ul style="list-style-type: none"> • Unresponsive • Decreased level of consciousness • Cannot awaken or keep awake • Markedly decreased activity • Very lethargic • Sleeps excessively • Inconsolable • Weak cry or weak suck • Refuses feeding 	<ul style="list-style-type: none"> • Altered mental status • Decreased level of consciousness • Cannot awaken or keep awake • Markedly decreased activity • Very lethargic • Sleeps excessively • Unresponsive
Dehydration and vomiting	<ul style="list-style-type: none"> • Reduced wet diapers during > 8 hrs 	<ul style="list-style-type: none"> • No urine > 6-8 hrs if < 1 year • No urine > 12 hrs if >1 year 	<ul style="list-style-type: none"> • No urine > 12 hours
Meningeal signs	<ul style="list-style-type: none"> • Bulging fontanelle • Seizures, tremor 	<ul style="list-style-type: none"> • Stiff neck • Persistent vomiting • Seizures • Altered mental status 	<ul style="list-style-type: none"> • Stiff neck • Persistent vomiting • Severe headache • Seizures • Altered mental status
Other	<ul style="list-style-type: none"> • Petechial or purpuric rash 	<ul style="list-style-type: none"> • Petechial or purpuric rash 	<ul style="list-style-type: none"> • Petechial or purpuric rash Increased urination with decreased intake

*Health Care Guideline: Viral Upper Respiratory Infection (VURI) in Adults and Children; Institute for Clinical Systems Improvement; Ninth Edition, May 2004; www.icsi.org

TREATMENT

Because agents causing the common cold most commonly are viruses (mainly rhinoviruses and coronaviruses), use of antibiotics is not only unnecessary but potentially harmful. It will increase the risk of colonization with resistant organisms and, thereby, heighten the chances that any subsequent invasive infection will be unresponsive to standard antimicrobial therapy.

Unnecessary antimicrobial therapy can be avoided by recognizing the signs and symptoms that are part of the usual course of this disease and thus are not suggestive of a secondary bacterial infection. Accordingly, when bacterial infections are treated with antibiotics the principles of their judicious use should be meticulously followed.

Symptomatic treatment for URIs should be directed to maximize relief of the most prominent symptom or symptoms.

Rest and increased fluid intake are nonspecific measures recommended for all URIs. Hundreds of over-the-counter (OTC) medications are available in a variety of combinations, and none of them has proved to be a "magic bullet".

When symptomatic relief is sought by patients, selected home remedies or preparations designed to treat symptoms may provide similar, although marginal, benefits without the risk of antimicrobial-resistant bacterial colonization or infection.

The following table (Table 12) summarizes most common URI symptoms and treatment recommendations:

Table 12: Treatment of Common URIs – Summary*

URI	Causative Agent(s)	Treatment
Common cold	Rhinovirus, coronavirus, respiratory syncytial virus (RSV), parainfluenza virus, influenza virus, adenovirus	Symptomatic: with decongestants, antihistamines, cough suppressant, etc.; in some cases - antiviral/anti-inflammatory combination
Pharyngitis	Viral: cold virus (see above), Coxsackie virus A, herpes simplex virus, Epstein-Barr virus, HIV Bacterial: Streptococcus pyogenes	Viral: symptomatic Bacterial: penicillin or amoxicillin if appropriate, erythromycin in penicillin- allergic patients
Laryngitis	Viral: influenza virus, rhinovirus, adenovirus, parainfluenza virus, RSV Bacterial: S. pyogenes Fungal: C. albicans (in immunosuppressed patients)	Resting voice, moist air treatments, antibiotics/antifungals if appropriate
Simple croup	Parainfluenza viruses type 1,2,3; influenza virus; RSV	Moist, humidified air; cool air; nebulized epinephrine corticosteroids
Epiglottitis	H. influenzae type B	Medical emergency, requires the establishment of artificial airway, antibiotics if indicated
Sinusitis	Acute: S. pneumoniae, H. influenzae, M. catarrhalis Chronic: S. aureus, S. pyogenes, anaerobes, resistant organisms from acute infection, P. aeruginosa, fungal infections	Analgesics, decongestants, antibiotics if appropriate, control allergic sinusitis, sinus irrigation, surgery

*http://www.uspharmacist.com/oldformat.asp?url=newlook/files/Feat/ACF2FEC.cfm&pub_id=8&article_id=126

PREVENTION OF THE COMMON COLD

Because wide variety of different viruses can cause colds and each virus changes over the time, an effective vaccine has not yet been developed. As of today, influenza is the only viral respiratory infection preventable by vaccination.

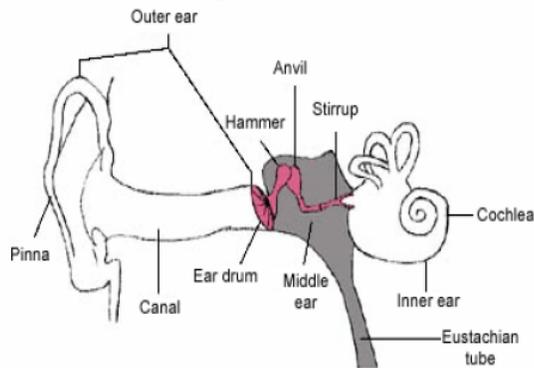
Despite their popularity, echinacea and high-dose vitamin C (up to 2,000 milligrams per day) have not been shown to prevent colds.

The best preventive measure is practicing good hygiene. Because many cold viruses are transmitted through contact with the secretions of an infected person, frequent handwashing is one of the best preventive measures. Good respiratory hygiene should be maintained, too.

<http://www.merck.com/mmhe/sec23/ch273/ch273i.html>

APPENDICES:

Appendix 1: Drawing of the Middle Ear



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Appendix 2: Definitions and Common Names Useful for Non-Clinicians

TERM	Common name or definition
adenoidectomy	removal of the adenoids (tissue in the back of the throat near the tonsils)
anvil	the middle bone of the 3 bones of the middle ear; also called incus
canal, external auditory	the passage leading from the opening of the external ear to the eardrum
cerumen	earwax
cochlea	a part of the inner ear, in the shape of a snail shell, which is the sensory organ of hearing
effusion	fluid in the middle ear
erythema	redness (of the eardrum)
eustachian tube	a tube connecting the middle ear to the back of the throat; responsible for equalizing pressure in the middle ear
hammer	the outermost bone of the 3 bones of the middle ear; shaped like a hammer; also called malleus
insufflation	blowing air into the ear to determine mobility of the eardrum, an indication of the presence or absence of fluid
mastoiditis	infection of the bone behind the middle ear
myringotomy	a surgical cut in the eardrum to drain fluid
otalgia	earache, pain in the middle ear
otitis media	inflammation of the middle ear
otolaryngolog-	referring to ENT, ear/nose/throat specialty
otorrhea	discharge from the ear
otoscopy	looking in the ear with an otoscope
pinna	the part of the outer ear projecting from the head
pneumatic otoscopy	observing eardrum movement when air is blown into the ear; to determine mobility of the eardrum, an indication of the presence or absence of fluid
rhinitis	runny nose
stirrup	the innermost bone of the 3 bones of the middle ear; also called stapes
tympanic membrane	eardrum, also abbreviated TM
tympanocentesis	obtaining a sample of fluid from the middle ear to determine the presence of bacteria or virus
tympanometry	a measurement of the mobility of the eardrum to determine the presence of fluid
tympanogram	the graph from a tympanometry test
tympanostomy tubes	tubes surgically placed in the eardrum to re-establish ventilation to the middle ear, also called: <ul style="list-style-type: none"> • ventilation tubes • PE tubes (pressure equalization tubes) • grommets

Appendix 3: Abbreviations and Definitions of Types of Otitis

Otitis Type	Definition	Comment
MEE (middle ear effusion)	Any fluid in middle ear space regardless of cause.	Assess presence by pneumatic otoscopy or tympanometry.
Myringitis	Erythema of tympanic membrane (TM) without MEE (may be mimicked by crying).	Most often viral. Does not respond to antibiotics. May be seen in early AOM or during resolution.
AOM (acute otitis media)	MEE with rapid onset of one or more of the following: otalgia, ear pulling, otorrhea, fever, irritability, anorexia, vomiting, or other symptoms.	Most frequent diagnosis by pediatricians: 48% of children by age 6 months, 79% by age 1 year and 90% by age 2 years (<i>Paradise 1997 [C]</i>).
Sporadic AOM	AOM occurring more than 3 months after a prior episode of AOM.	Compare to recurrent AOM.
Recurrent AOM (otitis-prone condition)	History of 6 episodes over a 12 month period, taking into account the severity of episodes, clustering of episodes, and persistence of otitis media with effusion.	Affects about 15-30% of children.
OME (otitis media with effusion)	MEE without signs or symptoms of infection.	Childhood prevalence of about 15%. Often follows AOM.
Chronic OME	OME with duration more than 3 months.	

Modified and adapted from: (Rosenfeld 1996 [S])

Appendix 4: Careful Antibiotic Use – Appropriate Treatment Summary

CAREFUL ANTIBIOTIC USE

Stemming the tide of antibiotic resistance: Recommendations by the CDC/AAP to promote appropriate antibiotic use in children.¹

Appropriate Treatment Summary

DIAGNOSIS	CDC/AAP Principles of Appropriate Antibiotic Use
Otitis Media	<ol style="list-style-type: none"> Classify episodes of OM as acute otitis media (AOM) or otitis media with effusion (OME). Only treat proven AOM. Antibiotics are indicated for treatment of AOM, however, diagnosis requires <ul style="list-style-type: none"> documented middle ear infection. and, signs or symptoms of acute local or systemic illness. Don't prescribe antibiotics for initial treatment of OME <ul style="list-style-type: none"> treatment may be indicated if bilateral effusions persist for 3 months or more.
Rhinitis and Sinusitis	<p>Rhinitis:</p> <ol style="list-style-type: none"> Antibiotics should not be given for viral rhinosinusitis. Mucopurulent rhinitis (thick, opaque, or discolored nasal discharge) frequently accompanies viral rhinosinusitis. It is not an indication for antibiotic treatment unless it persists without improvement for more than 10-14 days. <p>Sinusitis:</p> <ol style="list-style-type: none"> Diagnose as sinusitis only in the presence of: <ul style="list-style-type: none"> prolonged nonspecific upper respiratory signs and symptoms (e.g. rhinorrhea and cough without improvement for more than 10-14 days), or more severe upper respiratory tract signs and symptoms (e.g. fever >39°C, facial swelling, facial pain). Initial antibiotic treatment of acute sinusitis should be with the most narrow-spectrum agent which is active against the likely pathogens.
Pharyngitis	<ol style="list-style-type: none"> Diagnose as group A streptococcal pharyngitis using a laboratory test in conjunction with clinical and epidemiological findings. Antibiotics should not be given to a child with pharyngitis in the absence of diagnosed group A streptococcal infection. A penicillin remains the drug of choice for treating group A streptococcal pharyngitis.
Cough Illness and Bronchitis	<ol style="list-style-type: none"> Cough illness/bronchitis in children rarely warrants antibiotic treatment. Antibiotic treatment for prolonged cough (>10 days) may occasionally be warranted: <ul style="list-style-type: none"> Pertussis should be treated according to established recommendations. Mycoplasma pneumoniae infection may cause pneumonia and prolonged cough (usually in children older than 5 years); a macrolide agent (or tetracycline in children 8 years or older) may be used for treatment. Children with underlying chronic pulmonary disease (not including asthma) may occasionally benefit from antibiotic therapy for acute exacerbations.

When parents demand antibiotics. . .

- Provide educational materials and share your treatment rules to explain when the risks of antibiotics outweigh the benefits.
- Build cooperation and trust:
 - don't dismiss the illness as "only a viral infection"
 - explicitly plan treatment of symptoms with parents
 - give parents a realistic time course for resolution
 - prescribe analgesics and decongestants, if appropriate

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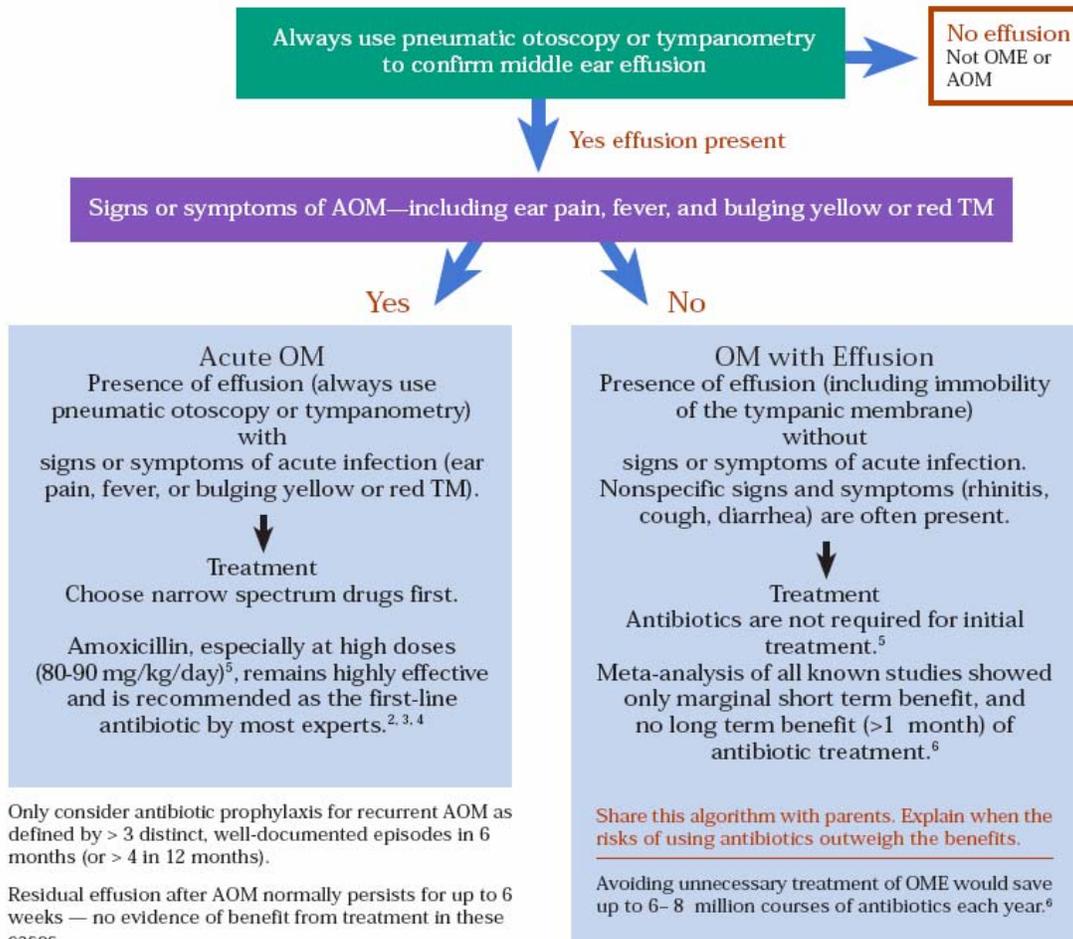
Appendix 5: Careful Antibiotic Use – Otitis Media (OM)

CAREFUL ANTIBIOTIC USE

Otitis media with effusion does not require antibiotic treatment.

Otitis Media (OM)

Differentiating Acute Otitis Media (AOM) from Otitis Media with Effusion (OME):
A tool for promoting appropriate antibiotic use.¹



Only consider antibiotic prophylaxis for recurrent AOM as defined by > 3 distinct, well-documented episodes in 6 months (or > 4 in 12 months).

Residual effusion after AOM normally persists for up to 6 weeks — no evidence of benefit from treatment in these cases.

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Appendix 6: Careful Antibiotic Use – Rhinitis Versus Sinusitis in Children

CAREFUL ANTIBIOTIC USE

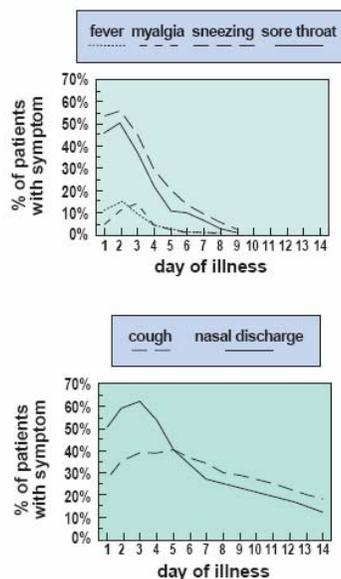
When parents request antibiotics for rhinitis or the “common cold” . . .
Give them an explanation, not a prescription.

Rhinitis Versus Sinusitis in Children¹

Remember:

Children have 2-9 viral respiratory illnesses per year.²
In uncomplicated colds, cough and nasal discharge may persist for 14 days or more – long after other symptoms have resolved.

Duration of symptoms in 139 rhinovirus colds³



Controlled studies do not support antibiotic treatment of mucopurulent rhinitis.⁴

Antibiotics do not effectively treat URI, or prevent subsequent bacterial infections.⁵

Don't overdiagnose sinusitis

Though most viral URIs involve the paranasal sinuses, only a small minority are complicated by bacterial sinusitis.

Avoid unnecessary treatment by using strict criteria for diagnosis:⁶

Symptoms of rhinorrhea or persistent day-time cough lasting more than 10 – 14 days without improvement.

OR

Severe symptoms of acute sinus infection:

- fever (> 39 C) with purulent nasal discharge
- facial pain or tenderness
- periorbital swelling

Treating sinusitis:

Target likely organisms with first-line drugs:
Amoxicillin, Amoxicillin/Clavulanate⁶

Use shortest effective course:

Should see improvement in 2-3 days. Continue treatment for 7 days after symptoms improve or resolve (usually a 10 – 14 day course).⁷

Consider imaging studies in recurrent or unclear cases:

But remember that early in the course of uncomplicated viral URI some sinus involvement is frequent — so interpret studies with caution.

Share the CDC/AAP principles and pamphlets with parents to help them understand when antibiotic treatment risks outweigh the benefits.

- rhinorrhea, fever, and cough are symptoms of viral URI
- changes in mucous to yellow, thick, or green are the natural course of viral URI, NOT an indication for antibiotics,⁸
- treating viral URI will not shorten the course of illness or prevent bacterial infection.⁵

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Appendix 7: Careful Antibiotic Use – Pharyngitis in Children

CAREFUL ANTIBIOTIC USE

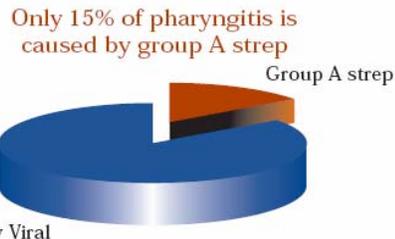
To avoid antibiotic resistance: treat only proven group A strep

Pharyngitis in Children¹

"If you are entirely comfortable selecting which pharyngitis patients to treat 10 days with penicillin, perhaps you don't understand the situation."

—Stillerman and Bernstein, 1961

- Most sore throats are caused by viral agents.²



- Clinical findings alone do not adequately distinguish Strep vs. Non-Strep pharyngitis.³
BUT, prominent rhinorrhea, cough, hoarseness, conjunctivitis, or diarrhea suggest a VIRAL etiology.⁴
- Antigen tests (rapid Strep kits) or culture should be positive before beginning antibiotic treatment.
Experts suggest confirming negative results on antigen tests with culture.⁵

Remember that most cases with clinical signs of strep, like exudate and adenopathy, are viral.

Experts discourage treatment pending culture results⁵⁻⁶, but if you do...

- Make sure to stop antibiotics when culture is negative.
- Discourage parents from saving antibiotics.

If an antibiotic is prescribed:

- Use a penicillin as treatment for group A strep.⁷
NO group A strep are resistant to penicillin. Treatment is 90% effective at elimination of strep, and may be higher in the prevention of acute rheumatic fever (ARF). Carriers are at very low risk for both ARF and spreading infection.⁷
- Use erythromycin if penicillin allergic.

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Appendix 8: Careful Antibiotic Use – Cough Illness/Bronchitis

CAREFUL ANTIBIOTIC USE

Cough illness in the well-appearing child: Antibiotics are NOT the answer.

Cough Illness/Bronchitis¹

Cough illness/bronchitis is principally caused by viral pathogens.² Airway inflammation and sputum production are non-specific responses and do not imply a bacterial etiology.

Authors of a meta-analysis of six randomized trials (in adults) concluded that antibiotics were ineffective in treating cough illness/bronchitis.³

Antibiotic treatment of upper respiratory infections do not prevent bacterial complications such as pneumonia.⁴

■ Do not use antibiotics for:

Cough <10-14 days in well-appearing child without physical signs of pneumonia.

■ Consider antibiotics only for:

Suspected pneumonia, based on fever with focal exam, infiltrate on chest x-ray, tachypnea, or toxic appearance.

Prolonged cough (>10-14 days without improvement) may suggest specific illnesses (e.g. sinusitis) that warrant antibiotic treatment.⁵

Treatment with a macrolide (erythromycin) may be warranted in the child older than five years when mycoplasma or pertussis is suspected.⁶

■ When parents demand antibiotics...

Acknowledge the child's symptoms and discomfort.

Promote active management with non-pharmacologic treatments.

Give realistic time course for resolution.

Share the CDC/AAP principles and pamphlets with parents to help them understand when the risks of antibiotic treatment outweigh the benefits.

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