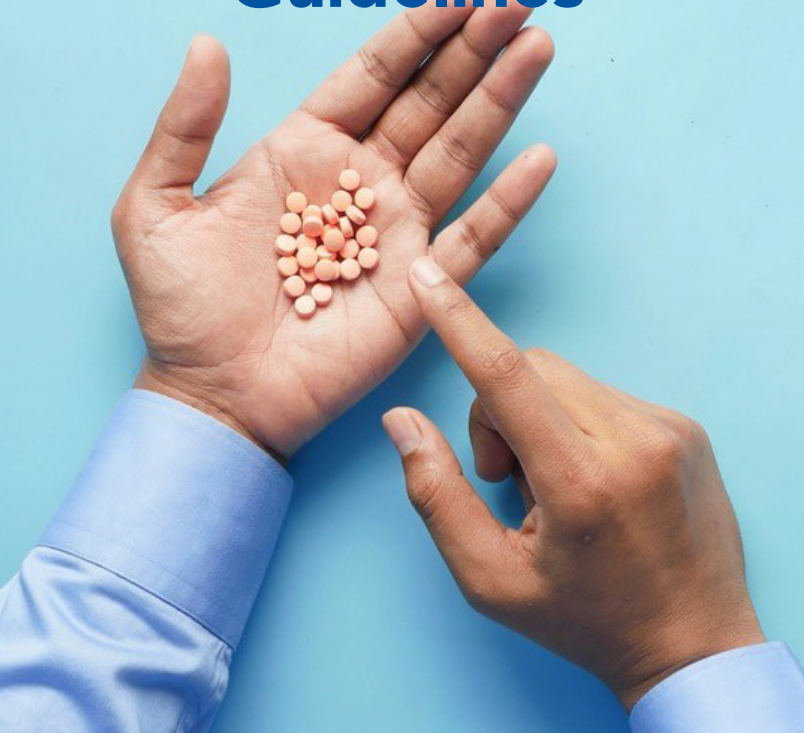




# Antibiotic Prescribing Guidelines



These recommendation summaries are adapted from the United States Centers for Disease Control and Prevention. *Antibiotic Prescribing and Use*. Accessed March 15, 2024. <https://www.cdc.gov/antibiotic-use/index.html>

## ADULT RECOMMENDATIONS EDITOR

**Tracey Quail Davidoff, MD, FCUCM**

Editor-in-Chief, *Evidence-Based Urgent Care*; Assistant Professor, Family Medicine, Florida State University College of Medicine; Attending Physician, BayCare Urgent Care, Tampa, FL

## PEDIATRIC RECOMMENDATIONS EDITOR

**Chrysa Charno, PA-C, MBA, FCUCM**

Chief Executive Officer and Clinical Director, Acute Kids Pediatric Urgent Care, Rochester, NY

## PHARMACOLOGY EDITOR

**Aimee Mishler, PharmD, BCPS**

Emergency Medicine Pharmacist, St. Luke's Health System, Boise, ID

## PEER REVIEWER

**Joseph Toscano, MD, FCUCM**

Emergency Physician, San Ramon Regional Medical Center, San Ramon, CA; Urgent Care Physician, John Muir Urgent Care, Walnut Creek, CA

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# Adult Outpatient Treatment Recommendations

## ■ Acute Rhinosinusitis

Viruses are the cause of 90% to 98% of cases. Antibiotics may not help even if the cause is bacterial.

### DIAGNOSIS

Symptoms indicating treatment with antibiotics of acute bacterial rhinosinusitis:<sup>1-4</sup>

- Severe symptoms or high fever ( $\geq 39^{\circ}\text{C}$  [ $102.2^{\circ}\text{F}$ ]) and purulent nasal discharge or facial pain lasting  $>3$ -4 days
- Persistent ( $\geq 10$  days) without improvement of nasal discharge or daytime cough; headache
- "Double worsening" (worsening or new onset fever, daytime cough, headache, or nasal discharge within 10 days after initial improvement of a viral URI)

Discolored nasal discharge does NOT indicate bacterial infection.

Sinus radiographs (including CT scans) are NOT routinely recommended.<sup>1,5</sup>

### MANAGEMENT

**If bacterial, watchful waiting is encouraged for uncomplicated or early infections with reliable follow-up.<sup>1-4</sup>**

Evidence-based supportive care:

- Saline nasal irrigation
- Intranasal corticosteroids (ie, fluticasone nasal spray)
- Oral pseudoephedrine, when there is Eustachian tube dysfunction and no contraindication
- OTC analgesics and antipyretics
- Topical nasal decongestants (eg, oxymetazoline) for short courses of  $<3$  days (limited evidence; may be minimally effective)<sup>6</sup>
- Phenylephrine, traditionally found in many OTC multisymptom cold preparations, is no more effective than placebo as a decongestant and is no longer recommended by the United States FDA; removal from the market has been proposed.<sup>7,8</sup>

**Mild/moderate disease and no risk factors for resistance:**

- Amoxicillin/clavulanate 500 mg/125 mg PO TID or 875 mg/125 mg PO BID x 5-7 days.<sup>2-4</sup> Some experts recommend plain amoxicillin when regional resistance is low.<sup>1,3</sup>

**Severe disease or with risk factors for resistance:**

- Amoxicillin/clavulanate 2 g/125 mg PO BID x 5-7 days<sup>1-4</sup>

**Penicillin-allergic patients:**

- Doxycycline 100 mg PO BID x 5-7 days<sup>3</sup>

Treatment for 10 days is not associated with better outcomes and is associated with a higher rate of complications.<sup>2</sup>

Macrolides (eg, azithromycin) and TMP-SMX are NOT recommended due to high levels of *S pneumoniae* antibiotic resistance (~40%-60%; varies by region).<sup>1,4,9</sup>

<sup>\*</sup>Aged  $>65$  years, antibiotics within 30 days, recent hospitalization, immunocompromised, or  $\geq 10\%$  penicillin-resistant *S pneumoniae*  
See references for additional treatment options (including re-treatment after initial treatment failure) and other important information.

## ■ Acute Uncomplicated Bronchitis

Viruses cause  $>90\%$  of acute bronchitis. Cough typically lasts 5 days to 3 weeks, but can last up to 6 weeks.

### DIAGNOSIS

Focus on ruling out pneumonia, which is rare among otherwise healthy adults without abnormal vital signs (heart rate  $>100$  beats/min, respiratory rate  $>24$  breaths/min, or oral temperature  $>38^{\circ}\text{C}$  [ $100.4^{\circ}\text{F}$ ]) and abnormal lung examination findings (focal consolidation, egophony, fremitus).<sup>1,10-12</sup>

Colored sputum does NOT indicate bacterial infection.<sup>1,10-12</sup>

For most cases, chest radiography is NOT indicated.<sup>1,10-12</sup>

Discourage antibiotic use by labeling acute bronchitis as a "chest cold" or "viral upper respiratory infection."

## MANAGEMENT

**Routine treatment of uncomplicated acute bronchitis with antibiotics is NOT recommended, regardless of cough duration.**<sup>1,10-12</sup>

Reassurance should be provided. Patients may benefit from symptomatic therapy, such as:

- Nonpharmacologic therapy such as honey,<sup>13,14</sup> cough drops, steam, herbal teas, smoking avoidance
- Cough suppressants such as dextromethorphan (no evidence for or against)<sup>1,10-12</sup>
- Expectorants such as guaifenesin<sup>1,10-12</sup>
- Albuterol inhalation; of benefit only if there is wheezing or pre-existing lung disease<sup>15</sup>

There is no evidence that corticosteroids decrease the length of illness or severity in uncomplicated bronchitis without asthma, but much evidence against their use due to side effects and complications.<sup>16</sup>

Consider pertussis, especially with cough paroxysms, posttussive emesis, or during known outbreaks.

*See references for additional treatment options and other important information.*

## Common Cold or Nonspecific Upper Respiratory Infection (URI)

Most healthy adults get 2 to 4 colds per year. Most colds resolve in 5 to 10 days.

### MANAGEMENT

**Antibiotic treatment is NOT recommended for nonspecific URIs.**<sup>1,17,18</sup> OTC analgesics can be given to relieve symptoms.

Oral pseudoephedrine can be given when there is eustachian tube dysfunction and no contraindication.

Phenylephrine, traditionally found in many OTC multisymptom cold preparations, is no more effective than placebo as a decongestant and is no longer recommended by the United States FDA; removal from the market has been proposed.

Evidence does NOT support antihistamines, intranasal corticosteroids, or nasal saline irrigation as effective treatments for cold symptom relief without evidence of sinusitis (ie, pain, pressure, severe congestion of sinuses).<sup>1,17,18</sup>

Ipratropium nasal spray can be given for nasal drainage; no benefit for congestion.

Home remedies such as honey or acacia honey are as effective as dextromethorphan in suppressing cough and may hasten improvement (most studies were done in children).<sup>13,14</sup>

Clinicians and patients must weigh the benefits and harms of symptomatic therapy.

## Pharyngitis

A positive test for GAS is the only indication for antibiotics in patients with pharyngitis.<sup>1,19,20</sup> Only 5% to 10% of sore throat cases in adults are caused by GAS;<sup>1,19,20</sup> most are nonspecific URIs, allergic rhinitis, and gastroesophageal reflux disease.

### DIAGNOSIS

Clinical features alone do NOT distinguish between GAS and viral pharyngitis; a RADT, PCR test, or long-term throat culture is necessary to establish a GAS pharyngitis diagnosis.<sup>1,19,20</sup>

Adults with sore throat and  $\geq 2$  of the following features ( $\geq 3$  if aged  $\geq 45$  years) should get a rapid test:<sup>1,19,20</sup>

- Lack of cough
- Tonsillar exudates
- History of fever
- Swollen and tender anterior cervical lymphadenopathy

Throat culture after negative rapid test are NOT routinely recommended for adults.<sup>1,19,20</sup>

Viruses (eg, Epstein-Barr virus) can also cause fever, exudate, and lymphadenopathy.

Streptococci from other groups (eg, C or G) do not require treatment.

Treatment is given to reduce the risk of poststreptococcal complications, not necessarily to improve symptoms faster.

## MANAGEMENT

Antibiotic treatment is NOT recommended for patients with negative rapid test results.<sup>1,19,20</sup>

GAS resistance to clindamycin and macrolides is increasingly common.

**First-line therapy options for GAS:**<sup>1,19</sup>

- Penicillin VK 250 mg PO QID or 500 mg PO BID x 10 days
- Amoxicillin 1 g PO daily or 500 mg BID x 10 days
- A full 10 days of treatment is still recommended for the prevention of rheumatic fever

**Non-type I penicillin allergy:**<sup>1,19</sup>

- Cephalexin 500 mg PO BID x 10 days
- Cefadroxil 1 g PO once daily x 10 days
- Cefpodoxime 100 mg PO BID x 10 days
- Cefuroxime 250 mg PO BID x 10 days

**Immediate type I penicillin or cephalosporin allergy:**<sup>19</sup>

- Clindamycin 300 mg PO TID x 10 days
- Azithromycin 500 mg PO once daily x 5 days

*See references for additional treatment options and other important information.*

## Acute Uncomplicated Cystitis

### DIAGNOSIS

Nitrites and leukocyte esterase are the most accurate indicators of acute uncomplicated cystitis.<sup>1,21-23</sup>

Antibiotic treatment of asymptomatic bacteriuria is NOT recommended in healthy adults EXCEPT for:

- Pregnant patients<sup>1,21-23</sup>
- Patients who are unable to communicate symptoms (dementia, nonverbal)<sup>1,21-23</sup>
- Before some urological procedures

### MANAGEMENT

**First-line therapy in healthy nonpregnant, premenopausal females, without history of resistant organisms:**<sup>1,21-23</sup>

- Nitrofurantoin 100 mg PO BID x 5 days (nitrofurantoin is NOT recommended if suspicious for early pyelonephritis)
- TMP-SMX 160 mg/800 mg PO (1 DS tablet) BID x 3 days (where local resistance is  $<20\%$ )

**Alternative agents in case of allergy, renal dysfunction, or known resistance:**<sup>1,21-23</sup>

- Fosfomycin 3 g PO x 1 dose (difficult to find, expensive)
- Amoxicillin/clavulanate 500 mg/125 mg PO BID x 3 days
- Cefpodoxime 100 mg PO BID x 5 days
- Cefuroxime 250 mg PO BID x 5 days

**Reserve fluoroquinolones (eg, ciprofloxacin, levofloxacin) for situations in which other agents are NOT appropriate.**

- Levofloxacin 250 mg PO daily x 3 days
- Ciprofloxacin 250 mg PO BID x 3 days
- If used, patients should be advised about the rare but potentially serious musculoskeletal, neurologic, and vascular complications that may occur. Moxifloxacin has poor penetration to urine and should not be used.<sup>1,21-23</sup>

Keep in mind resistance may vary by geographic location. Check your area's antibiogram for susceptibilities.

*See references for additional treatment options and other important information, especially if early pyelonephritis is suspected.*

Abbreviations: BID, 2 times per day; CT, computed tomography; DS, double strength; FDA, Food & Drug Administrations; GAS, group A *Streptococcus*; OTC, over-the-counter; PCR, polymerase chain reaction; PO, oral; RADT, rapid antigen detection test; TMP-SMX, trimethoprim-sulfamethoxazole; URI, upper respiratory infection.



Reference List for Adult Outpatient Treatment Recommendations  
[www.ebmedicine.net/antibiotics-adult](http://www.ebmedicine.net/antibiotics-adult)

# Pediatric Outpatient Treatment Recommendations

## ■ Acute Rhinosinusitis

Viruses are the cause of 90% to 98% of cases. Antibiotics may NOT help even if the cause is bacterial. The sinuses in children do not fully develop until age 12 years; true sinusitis is less common in younger children. Typical age to suspect bacterial sinusitis is 4 to 7 years.

### DIAGNOSIS

Symptoms indicating treatment with antibiotics of acute bacterial rhinosinusitis include:<sup>1-3</sup>

- Severe symptoms or high fever ( $\geq 39^{\circ}\text{C}$  [ $102.2^{\circ}\text{F}$ ]) and purulent nasal discharge or facial pain lasting  $>3$ -4 days
- Persistent ( $\geq 10$  days) without improvement of nasal discharge or daytime cough; headache
- "Double worsening" (worsening or new onset fever, daytime cough, headache, or nasal discharge  $>10$  days after initial improvement of a viral URI; fever may develop or recur on day 6 or 7 of illness after initial improvement)

Halitosis, fatigue, decreased appetite

Most physical examination findings are nonspecific and do NOT distinguish bacterial from viral causes.

Length of time is key to suspecting bacterial versus viral etiology.

Imaging tests are no longer recommended for uncomplicated cases.<sup>1,4</sup>

### MANAGEMENT

**If bacterial, consider watchful waiting for up to 3 days if NOT severe or worsening and with reliable follow-up.**<sup>1-3</sup>

Symptomatic care:

- Saline nasal irrigation and nasal suctioning
- Intranasal corticosteroids (ie, OTC fluticasone nasal spray)
- Antihistamines
- OTC analgesics and antipyretics

**Mild/moderate disease and no risk factors for resistance:**

- Amoxicillin/clavulanate 45 mg/kg/day PO of the amoxicillin component in 2 divided doses (max 875mg/dose) x 10 days.<sup>1-3</sup> Some experts recommend plain amoxicillin when regional resistance is low.<sup>3</sup>

**If severe or risk factors for resistance:\***

- Amoxicillin/clavulanate 90 mg/kg/day PO of the amoxicillin component in 2 divided doses (max 2 g/dose) x 10 days (amoxicillin-clavulanate 600 mg-42.9mg/5 mL suspension can be used for larger children)<sup>1-3</sup>

**Penicillin allergy:**

- Clindamycin 30 mg/kg/day PO in 3 divided doses (max 300 mg/dose)<sup>1-3</sup>  
**plus**  
Cefpodoxime 10 mg/kg/day PO in 2 divided doses (max 200 mg/dose) x 10 days **or** cefdinir 14 mg/kg/day PO in 2 divided doses (max 300 mg/dose) x 10 days

**Patient who cannot tolerate oral medication:**

- Ceftriaxone 50 mg/kg IM x 1 dose (max 1 g/dose), then oral antibiotics if improving

Macrolides (eg, azithromycin) are NOT recommended due to high levels of *S pneumoniae* antibiotic resistance (~40%-60%; varies by region)<sup>1-3</sup>

\*Aged  $<2$  years, daycare attendance, taken antibiotics within 30 days, recent hospitalization, underimmunized with PCV, immunocompromised, or  $\geq 10\%$  penicillin-resistant *S pneumoniae*

See references for additional treatment options (including re-treatment after initial treatment failure) and other important information.

## ■ Acute Otitis Media

Among children with AOM treated with antibiotics, 4% to 10% experience adverse effects.

### DIAGNOSIS

Definitive diagnosis requires **either**:<sup>1,5,6</sup>

- Moderate or severe bulging of tympanic membrane or new onset otorrhea NOT due to otitis externa

**OR**

Mild bulging of the tympanic membrane AND recent ( $<48$  hours) onset of otalgia (holding, tugging, rubbing of the ear in a nonverbal child) or intense erythema of the tympanic membrane

AOM should NOT be diagnosed in children without middle ear effusion (based on pneumatic otoscopy and/or tympanometry).

Severe AOM is defined as moderate or severe otalgia or otalgia for  $\geq 48$  hours, or temperature  $\geq 39^{\circ}\text{C}$  ( $102.2^{\circ}\text{F}$ ).

### MANAGEMENT<sup>1,5,6</sup>

**Treat with IMMEDIATE antibiotics (watch and wait is not appropriate in these cases):**

- AOM in children aged  $<6$  months
- Aged 6-23 months with bilateral AOM
- Severe AOM, regardless of age

**Consider watchful waiting (if reliable follow-up):**

- Aged 6-23 months with unilateral AOM
- Aged 2 years with unilateral or bilateral AOM

**If mild/moderate and no risk factors for resistance:**

- Amoxicillin 90 mg/kg/day PO in 2 divided doses (max 2 g/dose)

**If severe or risk factors for resistance:\***

- Amoxicillin/clavulanate 90 mg/kg/day of the amoxicillin component PO in 2 divided doses (max 2 g/dose)

**Penicillin allergy:**

- Cefdinir 14 mg/kg/day PO daily or in 2 divided doses (max 600 mg/day)
- Cefuroxime 30 mg/kg/day PO in 2 divided doses (max 500mg/dose)
- Cefpodoxime 10 mg/kg/day PO in 2 divided doses (max 400 mg/day)

**Resistant infections or inability to tolerate oral medication:**

- Ceftriaxone 50 mg/kg IM (max 1 g/dose) x 1-3 doses 24 hours apart (requires repeat evaluations to determine need for repeat therapy)

**Duration of treatment:**

- $<2$  years old or severe symptoms: 10 days
- 2-5 years old with mild-moderate symptoms: 7 days
- $\geq 6$  years old with mild-moderate symptoms: 5-7 days

\*Recent beta-lactam therapy, purulent conjunctivitis, or history of recurrent AOM unresponsive to amoxicillin

See references for more details, additional treatment options, and other important information.

## ■ Pharyngitis

During winter and spring, up to 20% of asymptomatic children can be colonized with GAS, leading to false positives from rapid testing and increases in unnecessary antibiotic exposure. Streptococcal pharyngitis is primarily a disease of children aged 5 to 15 years and is less common in preschool-aged children.

### DIAGNOSIS<sup>1,7,8</sup>

Clinical features alone do NOT distinguish between GAS and viral pharyngitis.

Children with sore throat plus 2 or more of the following features should undergo a rapid test:

- Lack of cough
- Tonsillar exudates
- History of fever
- Swollen and tender anterior cervical lymphadenopathy
- Aged  $<15$  years
- Fever
- Poor appetite
- Nausea/vomiting/diarrhea (may be the only presenting complaints in young children)

Unless rash is present in addition to symptoms listed above, testing should generally NOT be performed in children aged  $<3$  years (in this age group, GAS rarely causes pharyngitis and rheumatic fever is less common)

In children and adolescents, negative rapid tests should be confirmed with a throat culture; positive results do NOT require a follow-up culture. Treatment with antibiotics should NOT be initiated until culture returns positive.



## MANAGEMENT<sup>1,7,8</sup>

### First-line therapy:

- Amoxicillin 50 mg/kg/day PO (Max 1 g/day) once daily or in 2 divided doses x 10 days
- Penicillin-VK:
  - If ≤27 kg: 250 mg BID x 10 days
  - If >27 kg: 500 mg BID x 10 days
- Penicillin G benzathine:
  - If ≤27 kg: 600,000 units IM x 1 dose
  - If >27 kg: 1.2 million units IM x 1 dose

### Non-type I penicillin allergy:

- Cephalexin 40 mg/kg/day PO in 2 divided doses (max 1g/day) x 10 days

### Penicillin allergy:

- Cefuroxime 20mg/kg/day PO in 2 divided doses (max 250mg/dose) x 10 days
- Cefdinir 7 mg/kg/dose PO BID (max 300 mg/dose) x 5 days or 14 mg/kg/day PO daily (max 600 mg/day)x 10 days

### Immediate type I beta-lactam allergy\*:

- Clindamycin 7 mg/kg/dose PO TID x 10 days
- Azithromycin 12 mg/kg/day PO (max 500 mg) daily x 5 days

\*When penicillin and cephalexin cannot be used

See references for more details, additional treatment options, and other important information.

## ■ Common Cold or Nonspecific Upper Respiratory Tract Infection

Colds usually last around 10 days.

### DIAGNOSIS

Usually, nasal discharge begins clear and changes throughout the course of the illness. Fever, if present, occurs early in the illness.

### MANAGEMENT

**Antibiotics are NOT helpful and should NOT be used. Focus on symptomatic relief.**<sup>1,7,9</sup>

OTC cough and cold medications are NOT recommended for use in children aged <6 years. These medications are among the top 20 substances leading to death in children aged <5 years.<sup>1,7,9</sup>

Low-dose inhaled corticosteroids and oral prednisolone do NOT improve outcomes in nonasthmatic children. However, some clinicians give albuterol for a prolonged cough that interferes with sleeping and eating in very reactive patients, even without an asthma diagnosis.<sup>1,7,9</sup>

For children aged >2 years, home remedies such as honey or acacia honey are as effective as dextromethorphan in suppressing cough and may hasten improvement.<sup>1,10,11</sup>

See references for more details, additional treatment options, and other important information.

## ■ Bronchiolitis

### DIAGNOSIS<sup>1,12</sup>

Routine laboratory tests and radiologic studies are NOT recommended, but a chest x-ray may be warranted in atypical disease (absence of viral symptoms, severe distress, frequent recurrences, lack of improvement, recurrent fevers, increasing fatigue, poor oral intake).

### MANAGEMENT<sup>1,12</sup>

**Antibiotics are NOT helpful and SHOULD NOT be used.**

Symptoms typically worsen between days 3 and 5, followed by improvement. Nasal suctioning is the mainstay of therapy.

Initiate high-flow oxygen immediately if hypoxia is present; transfer to the ED for further observation.

Unless hospitalized, neither albuterol nor nebulized racemic epinephrine should be administered to infants and children with bronchiolitis.

There is no role for corticosteroids, ribavirin, or chest physiotherapy in the management of bronchiolitis.

See references for more details, additional treatment options, and other important information.

## ■ Urinary Tract Infections (UTIs)

### DIAGNOSIS<sup>1,13,14</sup>

In infants, fever and/or strong-smelling urine are common. A definitive diagnosis requires BOTH a urinalysis suggestive of infection with pyuria present AND at least 50,000 CFUs/mL of a single uropathogen from urine obtained through catheterization.

Diagnosis cannot be made from urine collected in a bag.

Urine collection should follow this pathway:

- For toilet-trained children, clean catch is the preferred method.
- For children still in diapers, starting with a bag sample is acceptable; if the bag sample is positive on urinalysis, standard of care is to obtain a sterile catheter specimen and send for culture.

Urine testing for all children aged 2-24 months with unexplained fever is no longer recommended, except in instances of prolonged fever or vomiting.

Urinalysis is suggestive of infection with the presence of pyuria (leukocyte esterase or ≥5 WBCs per high-powered field), bacteriuria, or nitrites.

Nitrites alone are NOT a sensitive measure for UTI in children and cannot be used to rule out UTIs. The combination of leukocyte esterase AND nitrites warrants the start of antibiotics before the return of urine culture. Urine culture is the standard of care for all suspected infections.

### MANAGEMENT<sup>1,13,14</sup>

**Initial antibiotic treatment should be based on local antimicrobial susceptibility patterns.**

#### First-line therapy:

- Cephalexin 50 mg/kg/day PO in 2 divided doses (max 500 mg/dose)
- Cefuroxime 30 mg/kg/day PO in 2 divided doses (max 1000 mg/day)
- Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)

#### Alternative agents:

- TMP-SMX 6-12 mg/kg/day of TMP component PO in 2 divided doses (max 160 mg of TMP/dose)
- Amoxicillin/clavulanate 20-40 mg/kg/day PO
- Duration of treatment:
  - First episode of uncomplicated, afebrile cystitis: 5 days
  - Aged >2 years with recurrent, febrile, or complicated cystitis: 7-10 days

If no clinical improvement in 48 hours, repeat urine culture should be performed.

Antibiotic treatment of asymptomatic bacteriuria in children is NOT recommended.

Antibiotic prophylaxis to prevent recurrent UTIs is NOT recommended.

See references for more details, additional treatment options, and other important information.

Abbreviations: AOM, acute otitis media; BID, 2 times per day; CFU, colony-forming unit; ED, emergency department; GAS, group A *Streptococcus*; OTC, over the counter; PCV, pneumococcal conjugate vaccine; PO, oral; TMP-SMX, trimethoprim-sulfamethoxazole; URI, upper respiratory infection; UTI, urinary tract infection; WBC, white blood cell.



Reference List for Pediatric Outpatient  
Treatment Recommendations  
[www.ebmedicine.net/antibiotics-pediatric](http://www.ebmedicine.net/antibiotics-pediatric)