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**Acute Otitis Media** *(AAP guideline 2013)*

Underlying conditions that may alter the natural course of AOM include, though are not limited to:
- Presence of tympanostomy tubes
- Anatomic abnormalities (including cleft palate)
- Genetic conditions with craniofacial abnormalities (such as Down Syndrome)
- Immune deficiencies
- Presence of cochlear implants

**Criteria for diagnosis of AOM:**
- Middle ear effusion
- PLUS one of the following:
  - Moderate/severe bulging of TM
  - New onset otorrhea not caused by otitis externa
  - Mild bulging of TM and 48 hours of otalgia
  - Mild bulging of TM & intense erythema of the TM

**Initiate antibiotics**

<6 months
- Acute Otitis Media (AOM)?
  - Yes
  - Assess and treat ear pain (see Table 3 in AAP guideline for Otitalgia treatments)
  - Non-severe symptoms:
    - Mild otalgia <48 hours AND Temperature < 39°C (102.2°F)
    - What is the patient's severity of symptoms?
    - Severe signs/symptoms:
      - Moderate/severe otalgia OR
      - Temperature ≥ 39°C (102.2°F) OR
      - Otitalgia ≥ 48 hours
    - Is the infection bilateral?
      - Yes
      - Initiate antibiotics x 10 days
      - ≥24 months: Watchful waiting (WW) / Safety-net antibiotic prescription (SNAP) OR initiate antibiotics
      - No
  - Yes
  - Does pt. have any underlying condition that would change the natural course of AOM?
  - No
  - Yes
  - Yes

> 6 to 24 months
- Is the patient's age?< 6 months 6 to 24 months ≥ 24 months

≥ 24 months
- Watchful waiting (WW) / Safety-net antibiotic prescription (SNAP) OR initiate antibiotics

Antibiotic duration for amoxicillin, amoxicillin/clavulanate, cefuroxime, cefdinir, cefpodoxime, and clindamycin:
- <2 years of age OR severe AOM OR chronic AOM OR recurrent AOM OR TM perforation = 10 days
- 2-5 years of age with non-severe symptoms = 7 days
- ≥6 years of age with non-severe symptoms = 5-7 days

This care process model was developed by the AOM QI Team and ASP, 1/1/2018
Acute Otitis Media (AAP guideline 2013)¹

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Dosing of antibiotics found in algorithm:
- Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose)
- Amoxicillin/clavulanate 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg amoxicillin component/dose)
- Cefuroxime 250 mg PO BID (max 500 mg/dose) for children able to swallow pills (only available in tablet form)
- Cefdinir 7 mg/kg/dose PO BID (max 300 mg/dose)
- Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
- Ceftriaxone 50 mg/kg/dose IM/IV qDay x 1-3 days* (daily max 1 gram/dose)
  *Administer Ceftriaxone for 1 day when used as a first line for patients with penicillin allergy, and 3 days if the patient has failed other antibiotics
- Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)

Antibiotic duration for amoxicillin, amoxicillin/clavulanate, cefuroxime, cefdinir, cefpodoxime, and clindamycin:
- <2 years of age OR severe AOM OR chronic AOM OR recurrent AOM OR TM perforation = 10 days
- 2-5 years of age with non-severe symptoms = 7 days
- ≥6 years of age with non-severe symptoms = 5-7 days

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¹ This care process model was developed by Lisa Hiskey and ASP, 11/2018
Acute Otitis Media (AAP guideline 2013)\(^1\)

Watchful waiting (WW)/ Safety-Net Antibiotic Prescription (SNAP):
- Joint decision between provider and caregiver
- Must have close follow-up (within 48-72 hours) if SNAP not given
- Must be able to fill antibiotic prescription if signs/symptoms worsen or fail to improve in 48-72 hours from onset of symptoms

**NOTE:** If using WW/SNAP, please place a comment in prescription instructions to “fill only upon patient/family request”

**Antibiotic Recommendations**
- First line:
  - Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose)
- Alternative therapies:
  - If received amoxicillin within the past 30 days OR concomitant conjunctivitis:
    - Amoxicillin/clavulanate 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg amoxicillin/dose)
      - For liquid, use Augmentin ES-600\(^\text{TM}\) 600mg/42.9mg/5mL
      - For pills, use 875 mg tablets or 1000 mg XR tablets
  - Mild/moderate penicillin allergy (e.g. rashes including hives):
    - Cefuroxime 250 mg PO BID for children able to swallow pills (only available in tablet form)
    - Cefdinir 7 mg/kg/dose PO BID (max 300 mg/dose)
    - Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
    - Ceftriaxone 50 mg/kg/dose IM/IV qDay x 1-3 days (max 1000 mg/dose)
      **NOTE:** Risk of penicillin/cephalosporin cross-reactivity extremely low
      **NOTE:** Some cephalosporins may have limited availability and/or may be cost-prohibitive
  - Severe penicillin allergy (e.g. anaphylaxis):
    - Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)
  - Failure to improve after 48-72 hours of initial antibiotic:
    - Treatment failure with amoxicillin
      - Amoxicillin/clavulanate 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg amoxicillin/dose)
        - For liquid, use Augmentin ES-600\(^\text{TM}\) 600mg/42.9mg/5mL
        - For pills, use 875 mg tablets OR XR 1000 mg tablets
    - Treatment failure with amoxicillin/clavulanate:
      - Ceftriaxone 50 mg/kg/dose (max 1000 mg/dose) IM or IV daily x 3 days
      **OR**
      - Cefuroxime or cefpodoxime PLUS clindamycin
Otorrhea

- AOM with a perforated tympanic membrane (the following could be considered in addition to systemic antibiotic) OR AOM with presence of patent tympanostomy tubes:
  - Ciprodex® (Ciprofloxacin 0.3% - Dexamethasone 0.1%) otic suspension, 4 drops instilled into affected ear twice daily for 7 days for patients >6 months of age
    - If Ciprodex® on shortage or cost-prohibitive, may use ciprofloxacin ophthalmic 2 drops +/- dexamethasone ophthalmic 2 drops twice daily for 7 days in patients >6 months of age
  - Ofloxacin otic solution, 5 drops into affected ear twice daily for 10 days for children > 6 months of age
- Otitis externa with intact tympanic membrane
  - May use Ciprodex®, ciprofloxacin ophthalmic/dexamethasone ophthalmic or Ofloxacin as noted above
  - OR
  - Cortisporin® otic (neomycin-polymyxin B-hydrocortisone otic), 3 drops to affected ear 3 times per day for 7 days
Group A Streptococcal pharyngitis (IDSA guidelines 2012)²

Please refer to CPG for testing algorithm:

NOTE: GAS pharyngitis is uncommon in children <3 years of age and children of any age with viral symptoms

- First Line:
  - Amoxicillin 50 mg/kg/dose PO qDay (max 1000 mg/day) x 10 days
  - Penicillin G benzathine IM x 1
    - < 27 kg: 600,000 U
    - ≥ 27 kg: 1.2 million U
  - Penicillin VK
    - < 27 kg: 250 mg PO BID – TID x 10 days
    - ≥ 27 kg: 500 mg PO BID – TID x 10 days
- Alternative therapies:
  - Mild penicillin allergy (e.g. rashes including hives):
    - Cephalexin 20-25 mg/kg/dose PO BID (max 500 mg/dose) x 10 days
  - Severe penicillin allergy (e.g., anaphylaxis):
    - Clindamycin 7 mg/kg/dose PO TID (max 300 mg/dose) x 10 days
    - Azithromycin 12 mg/kg/dose PO qDay (max 500 mg/dose) x 5 days

**NOTE:** Azithromycin is **not recommended** unless patient has severe allergy to penicillin and cephalosporins. Resistance is well known, and treatment failure may occur
Uncomplicated community-acquired pneumonia (IDSA guidelines 2011)

Please refer to CPG:

- Duration: 5-7 days
- First line:
  - Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose)
- Alternative therapies:
  - Mild/moderate penicillin allergy (e.g. rashes including hives):
    - Cefuroxime 250 mg PO BID for children able to swallow pills (only available in tablets)
    - Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
    - Cefprozil 15 mg/kg/dose PO BID (max 500 mg/dose)
  
  NOTE: Cefdinir is NOT recommended for empiric treatment of CAP as it is less effective against Streptococcus pneumoniae

  NOTE: Some cephalosporins may have limited availability and/or may be cost-prohibitive. If the above noted antibiotics are not available, clindamycin is preferred over cefdinir.
  - Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)
  - Severe penicillin allergy (e.g anaphylaxis)/ cephalosporin allergy:
    - Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)
  - Severe penicillin allergy / cephalosporin allergy AND intolerance of clindamycin:
    - Levofloxacin 8-10 mg/kg/dose PO BID (ages 6 months – 5 years) OR qDay (≥ 5 years) (max 750 mg/day)

- Atypical pneumonia (consider in adolescents with bilateral disease):
  - Azithromycin 10 mg/kg/dose PO qDay on day #1 (max 500 mg/dose), then 5 mg/kg/dose PO qDay on days #2-5 (max 250 mg/dose)
  
  NOTE: resistance to azithromycin is significant among typical bacterial pathogens, especially Streptococcus pneumoniae
Acute bacterial rhinosinusitis (ABRS) (AAP guidelines 2013)\(^4\)

**Presumptive diagnosis of ABRS:**
1. Persistent illness (i.e. nasal discharge), daytime cough or both lasting >10 days without improvement
   OR
2. Worsening course (i.e. worsening or new onset nasal discharge, daytime cough or fever) after initial improvement
   OR
3. Severe onset (i.e. concurrent fever $\geq39^\circ C/102.2^\circ F$) AND purulent nasal discharge for at least 3 days

**Consider age, severity of symptoms, daycare attendance and recent antibiotic exposure**

- **Mild-moderate symptoms**
  - AND
  - Does not attend daycare
  - AND
  - No antibiotic treatment in past 30 days
  - AND
  - $\geq 2$ years of age
  - Amoxicillin

- **Mild-moderate symptoms**
  - AND
  - Attends daycare
  - OR
  - Received antibiotic treatment in past 30 days
  - OR
  - < 2 years of age
  - Amoxicillin/clavulanate

- **Severe symptoms**
  - Clindamycin PLUS
  - Cefpodoxime
  - OR
  - Cefuroxime
  - OR
  - Cefixime
  - Severe Penicillin / cephalosporin allergy
  - Levofloxacin

**Diagnosis of acute bacterial rhinosinusitis**

If patient is immunocompromised, consult on-call Infectious Diseases
Acute bacterial rhinosinusitis (ABRS) (AAP guidelines 2013)\(^4\)

- **Diagnosis**
  
  **NOTE:** ABRS is uncommon in children < 2 years of age

  Presumptive diagnosis of ABRS can be made if patient with acute URI presents with:
  
  - Persistent illness (i.e. nasal discharge), daytime cough, or both lasting >10 days without improvement
    
    **OR**
  
  - Worsening course after initial improvement (i.e. worsening or new onset nasal discharge, daytime cough or fever)
    
    **OR**
  
  - Severe onset (i.e. concurrent fever ≥39°C/102.2°F) AND purulent nasal discharge for at least 3 consecutive days

- **Treatment**
  
  - Duration: 10 days
  
  - Treatment should continue for at least 7 days after resolution of symptoms
  
  - First line:
    
    - Mild-moderate disease AND patient ≥ 2 years of age, AND does not attend daycare, AND has not received antibiotics within the past 30 days
      
      - Amoxicillin - **Standard dose**: 22.5-25 mg/kg PO BID (max 875 mg/dose)
        
        - **Recommended at CM due to Streptococcus pneumoniae resistance <10%**
      
      - Amoxicillin - **High-dose**: 45-50 mg/kg PO BID (max 2000 mg/dose)
        
        - Recommended in communities with high prevalence of penicillin non-susceptible *Streptococcus pneumoniae*

  - Severe disease **OR** mild-moderate disease WITH any of the following: <2 years of age, attends daycare, received antibiotics within the past 30 days

    - Amoxicillin-clavulanate - **High dose**: 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg/dose)
      
      - For liquid, use Augmentin ES-600\(^\text{TM}\) 600mg/42.9mg/5mL
      
      - For pills, use 875 mg or 1000 mg XR tablets

    (see next page for alternative therapies)
Alternative therapies for acute bacterial rhinosinusitis:
  • Mild/moderate penicillin allergy (e.g. rashes including hives):
    • Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)

    PLUS one of the following cephalosporins:
    • Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
    • Cefuroxime 250 mg PO BID for children able to swallow pills
      (only available in tablets)
    • Cefixime 4 mg/kg/dose PO BID (max 200 mg/dose)

      NOTE: Risk of penicillin/cephalosporin cross-reactivity
      extremely low

      NOTE: Some cephalosporins may have limited availability
      and/or variable insurance coverage

  • Severe penicillin allergy (e.g. anaphylaxis) or cephalosporin allergy:
    • Levofloxacin 10 mg/kg/dose PO BID (6 months- 5 years) OR
      qDay (≥5 years) (max 500 mg/day)
    • Consider consulting Infectious Diseases physician

NOTE: per AAP guideline, even patients with a history of serious type
1 immediate reaction to penicillin may be safely treated with
cefuroxime and cefpodoxime given low risk of cross-reactivity
Cystitis (uncomplicated urinary tract infection) in children >2 months of age

If history of UTIs, empiric therapy should be based on previous microbiology, if available

- Duration:
  - Adolescents (> 13 years old): 3 days
  - Younger children: 5-7 days
- First line:
  - Cephalexin 16.6 mg/kg/dose PO TID (max 1500 mg/day)
- Alternative therapies:
  - Cefixime 8 mg/kg/dose PO qDay (max 400 mg/day)
  - Amoxicillin/clavulanate 13.3 mg/kg/dose PO TID (max 500 mg amoxicillin/dose)
- Severe penicillin allergy (e.g. anaphylaxis) / cephalosporin allergy:
  - TMP/SMX 3-6 mg/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose)
    
    **NOTE:** At CMH, there are increasing rates of *E coli* resistance to TMP/SMX

  - Nitrofurantoin (treatment duration **5-7 days**)
    - Macrocrystal (Macrodantin® or Furadantin®) 1.25-1.75 mg/kg/dose PO q6h (max 100 mg/dose) =
    - Macrocrystal/monohydrate (Macrobid®) 100 mg PO BID FOR ADOLESCENTS ONLY

**NOTE:** Cefdinir should not be used for UTI due to poor urine concentration
Pyelonephritis (febrile urinary tract infection) in children > 2 months of age (AAP guidelines 2011)

Evaluate need for admission

General indications for admission include age < 2 months, ill appearance, poor intake, unable to tolerate oral antibiotic, vomiting, immune compromise, urinary tract obstruction and/or culture-positivity for bacteria known to be resistant to oral antibiotics

If history of UTIs, empiric therapy should be based on previous microbiology if available

- Duration: 7-14 days
- First line:
  - Cephalexin 25-33 mg/kg/dose PO TID (max 1500 mg/day)
- Alternative therapies:
  - Cefixime 8 mg/kg/dose PO qDay (max 400 mg/day)
  - Amoxicillin/clavulanate 13.3 mg/kg/dose (amoxicillin component) PO TID (max 500 mg amoxicillin/dose)
- Severe penicillin allergy (e.g. anaphylaxis) /cephalosporin allergy:
  - TMP/SMX 3-6 mg TMP/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose)
    
    **NOTE:** At CMH, there are increasing rates of *E. coli* resistance to TMP/SMX
  - Ciprofloxacin 10 mg/kg/dose PO BID (max 500 mg/dose)

**NOTE:** Cefdinir should not be used for UTI due to poor urine concentration
Skin and soft tissue infections (IDSA guidelines 2014)⁶

- **Impetigo**
  - Mild cases with few lesions
    - Topical mupirocin TID x 5 days
    - Topical retapamulin BID x 5 days
  - Numerous lesions or outbreaks involving several patients
    - Duration: 5-7 days
    - First line treatment:
      - Cephalexin 9-17 mg/kg/dose PO TID (max 250 mg/dose) x 5-7 days
    - Alternative therapies:
      - Amoxicillin/clavulanate 12.5 mg/kg/dose (amoxicillin component) PO BID (max 875 mg/dose) x 5-7 days
      - If MRSA suspected or confirmed (i.e. personal or family history of MRSA) AND/OR severe penicillin/cephalosporin allergy:
        - Clindamycin 7 mg/kg/dose PO TID (max 450 mg/dose) x 5-7 days
        - TMP-SMX 4-6 mg/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose) x 5-7 days
        - **NOTE:** TMP-SMX may not cover *Streptococcus pyogenes* (group A Streptococcus)

- **Cellulitis**
  - Duration: 5-7 days
  - First line:
    - Cephalexin 17 mg/kg/dose PO TID (max 500 mg/dose)
    - If cephalosporin allergy OR MRSA suspected (i.e. personal or family history of MRSA):
      - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)

- **Abscess:**
  - In addition to incision and drainage with culture:
    - Duration: 5-7 days
    - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)
    - OR
    - TMP-SMX 4-6 mg/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose)
**Animal/Human bites**

- **Duration:**
  - Prophylaxis (for moderate to severe wounds with edema or crush injury, puncture wounds or facial bite wounds): 3 days
  - Treatment of infected wound: 5-10 days
- **First line:**
  - Amoxicillin/clavulanate 22.5 mg/kg/dose (amoxicillin component) PO BID (max 875 mg amoxicillin/dose)
- **Penicillin allergy:**
  - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose) PLUS TMP-SMX 5 mg/kg (trimethoprim component) PO BID (max 160 mg TMX/dose)

**Dental abscess**

Assess for complicated infection (i.e. ill-appearing, signs of deep neck space infection, osteomyelitis of the mandible)

- **Duration:** 10 days
- **First line:**
  - Amoxicillin 17 mg/kg/dose PO TID (max 500 mg/dose)
- **Alternative for complicated infections or amoxicillin failure**
  - Amoxicillin/clavulanate 25 mg/kg/dose (amoxicillin component) PO BID (max 875 mg amoxicillin/dose)
- **If buccal involvement AND/OR penicillin allergy:**
  - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)

**Acute lymphadenitis**

- **First line:**
  - Cephalexin 17-25 mg/kg/dose PO TID (max 1000 mg/dose) x 7-10 days
- **Alternative therapy:**
  - Amoxicillin/clavulanate 22.5 mg/kg/dose (amoxicillin component) PO BID x 7-10 days (max 875 mg amoxicillin/dose)
- **If concern for MRSA (i.e. personal or family history of MRSA) AND/OR severe penicillin or cephalosporin allergy:**
  - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose) x 7-10 days
- **If concern for *Bartonella henselae* (treatment may shorten duration of adenopathy):**
  - Azithromycin 12 mg/kg PO qDay (max 500 mg/dose) x 5 days
### Dosing of amoxicillin-clavulanate

**NOTE:** Dosing of amoxicillin-clavulanate (Augmentin®) is based on amoxicillin component. “High dose” of amoxicillin-clavulanate is targeted at providing higher amoxicillin doses to overcome *Streptococcus pneumoniae* resistance while keeping within recommended dosing range for clavulanate (about 6-10 mg/kg/day)

<table>
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<th>Formulation</th>
<th>Usual Dosing</th>
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<td>Infection in ≤3 months of age</td>
<td>Augmentin™ 250 mg-62.5mg/5mL OR 125mg-31.25mg/5mL suspension</td>
<td>30 mg/kg/day divided twice daily</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Usual Dosing</td>
<td></td>
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<td></td>
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<tr>
<td>Less severe infections (&gt;3 months of age)</td>
<td>Augmentin™ 400 mg-57mg/5 mL suspension</td>
<td>25 – 45 mg/kg/day divided twice daily</td>
<td>Augmentin™ 500mg-125mg or 875mg-125mg tablet OR 400 mg-57mg/5mL suspension</td>
</tr>
<tr>
<td>Usual Dosing</td>
<td></td>
<td></td>
<td>500 – 875 mg twice daily</td>
</tr>
<tr>
<td>Otitis Media, pneumonia, or refractory sinusitis (&gt;3 months)</td>
<td>Augmentin™ ES 600mg-42.9mg/5mL suspension</td>
<td>80 – 100 mg/kg/day divided twice or three times daily</td>
<td>Augmentin™ XR 1000mg-62.5mg tablet OR Augmentin™ ES 600 mg/5mL suspension</td>
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**Prescribing practices may deviate from these guidelines depending on clinical factors (e.g. location of infection, bacterial susceptibility, patient characteristics, etc).** Please consult a pharmacist or Antimicrobial Stewardship for additional assistance in selecting formulations.
References


Do not hesitate to reach out to infectious diseases in case of doubt!
Questions/comments, please email relfeghaly@cmh.edu or lmhiskey@cmh.edu.
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