Diagnosis and Management of

Acute Otitis Media (Ear Infection), Pediatric

Canyons, Desert, and Peaks Regions 2025 update

This care process model (CPM), produced by Intermountain Healthcare's Antibiotic Stewardship and Pediatrics enterprise service lines, is based on the American Academy of Pediatrics (AAP) Clinical Practice Guidelines.[1] It provides best-practice recommendations for diagnosis and management of acute otitis media (AOM), including appropriate use and duration of antibiotics.

Key Recommendations

The following is a list of key recommendations for the diagnosis and treatment of AOM.

Diagnosing AOM

- Only diagnose acute otitis media (AOM) if the exam and symptoms meet diagnostic criteria found on page 2.

Otitis Media with Effusion (OME)[1-]

- If diagnosing otitis media with effusion (OME), do not prescribe antibiotics.
- Antibiotics do not help OME heal faster and increase costs, risk of antibiotic resistance, and patient exposure to unnecessary side effects.

Antibiotic treatment v. observation [1–3]

- Severity of infection should drive the decision of antibiotic treatment or observation.
- The 2013 guidelines published by the AAP offer observation without antibiotics as a treatment option. Observation should be considered:
  - in children ≥2 years old with mild/moderate AOM.
  - in children 6–23 months with mild/moderate unilateral AOM.

Using shared decision making with patients and families.

- The decision to initiate antibiotic treatment or to observe should be made in partnership with the child's caregivers, following a thorough discussion of the benefits and risks associated with each approach.[4,9]

Choice of Antibiotics

- Azithromycin is NOT the preferred antibiotic treatment of AOM due to widespread resistance in organisms that cause this condition.
- Amoxicillin is the recommended first-line treatment. If additional coverage is needed, amoxicillin-clavulanate (preferably the ES 600 mg/5 mL formulation) is preferred over cefdinir.
- In children that can swallow tablets, cefpodoxime is more effective than cefdinir.

Antibiotic treatment duration

- Antibiotic treatment duration should be based on the characteristics of AOM and age of patient.[5] See new duration recommendations on pg 3.

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Measurements

- Percentage of patients with AOM that are prescribed a delayed prescription.
- Median duration of antibiotic therapy for AOM.
- Percentage of patients diagnosed with AOM that are treated with amoxicillin.

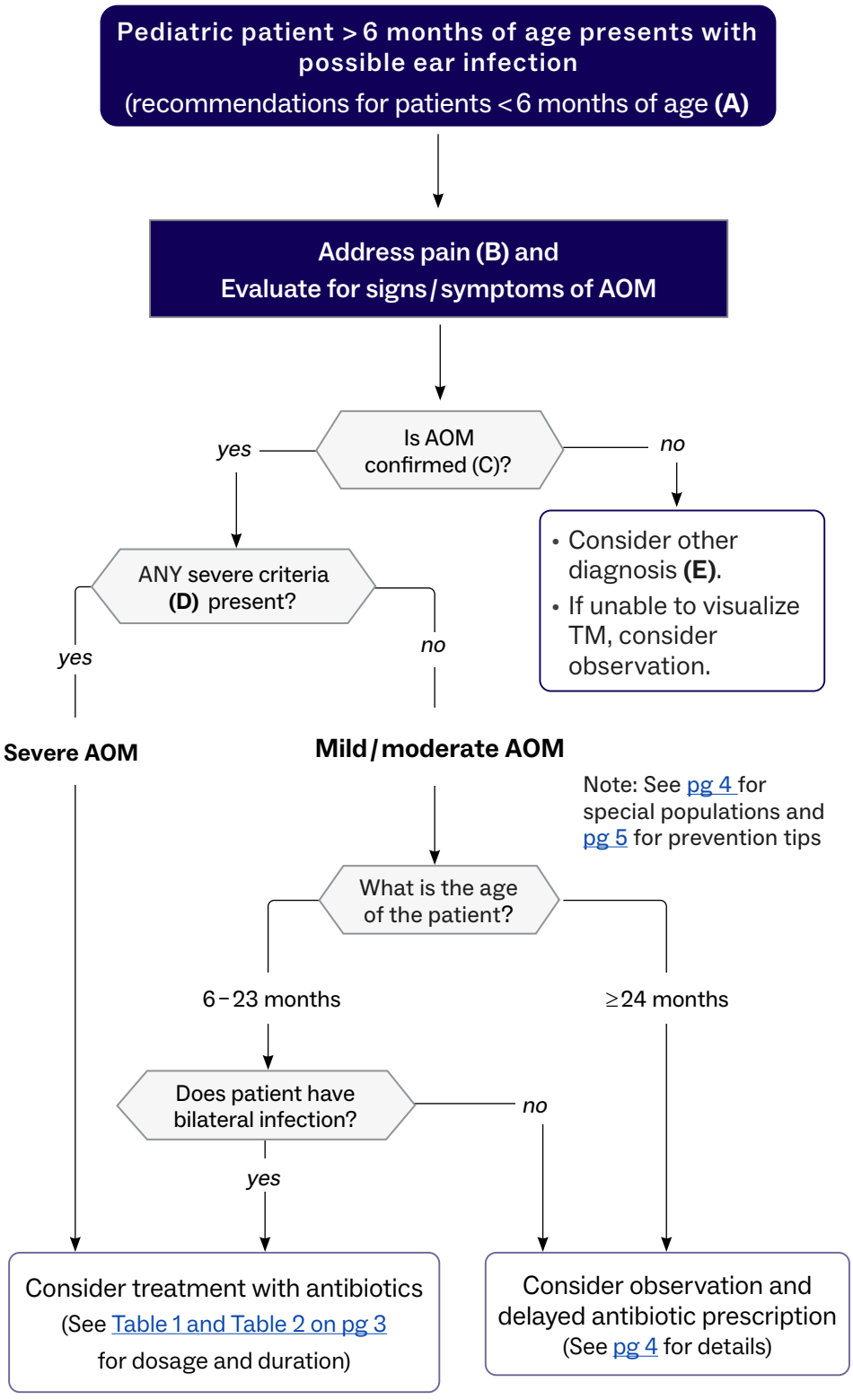
Key Evidence

Lieberthal AS, Carroll AE, Chonmaitree T, et al. American Academy of Pediatrics Clinical Practice Guideline: The diagnosis and management of acute otitis media. *Pediatrics.* 2013;131;e964-e999.

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Diagnosis, Severity Determination, and Treatment in Pediatric AOM



The decision to initiate antibiotic treatment or to observe should be made in partnership with the child's caregivers, following a thorough discussion of the benefits and risks associated with each approach.

Note: If patient diagnosed with AOM returns with effusion, restart the algorithm.

(A) Patients < 6 mos. of age

- Research limited, guidelines don't address.
- Most physicians recommend standard antibiotic treatment. See Table 1 and 2 on pg 3 for recommended dosing and durations.

(B) Addressing Pain

- Pain should be addressed whether or not antibiotics are prescribed.
- Recommend analgesics such as ibuprofen or acetaminophen for symptomatic relief.
- Antibiotics do no relieve pain in first 24 hrs.
- Analgesics often give brief relief.
- Continue analgesics as long as necessary.
- Preverbal children often express pain as: holding/tugging ear, excessive crying, or changes in sleep or behavior.

(C) AOM diagnostic criteria

Middle ear effusion (based on pneumatic otoscope and/ or tympanometry) AND any of the following:

- Moderate/severe bulging of tympanic membrane (TM).
- Mild bulging of TM with new pain (presenting < 48 hours ago).
- Mild bulging of TM with severe erythema.
- New otorrhea (without otitis externa).

Patients with pressure equalization tubes will not have bulging TM.

(D) AOM severe criteria

Any of the following:

- Profound bulging of TM.
- Temperature ≥102.2°F (39°C) not improving with acetaminophen or ibuprofen use.
- Moderate/severe otalgia without relief from analgesics.
- Otalgia for >72 hours.
- Otorrhea.

(E) OME v. AOM

Consider the following in patients with OME but do not fit AOM criteria:

- OME is common and often long-lasting following AOM and upper respiratory tract infections in which eustachian tubes have become blocked.
- OME can predispose patient to later AOM, but OME itself is not improved with the use of antibiotics. Watch patients for progression to AOM.
- DO NOT treat OME with antibiotics; treat only for pain as needed.

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Antibiotic Use and Duration in Treatment of AOM

TABLE 1. Recommended antibiotic therapy for acute otitis media, patients 0 – 18 years of age

	Drug	Dose and frequency
NO penicillin allergy	First-line antibiotic	
	amoxicillin[1]	45 mg/kg/dose orally two times per day (max 1 g/dose)
	Second-line antibiotics	
	amoxicillin + clavulanate (ES preferred)[2]	45 mg amox/kg/dose orally two times per day (max 1 g amox/dose)
	ceftriaxone	50 mg/kg/dose intravenously or intramuscularly once per day (max 1,000 mg/dose)
YES penicillin allergy	First-line antibiotics	
	cefpodoxime[3]	5 mg/kg/dose orally two times per day (max 200 mg/dose)
	cefdinir[4]	14 mg/kg/dose orally once per day (max 600 mg/dose)
	Second-line antibiotics	
	ceftriaxone	50 mg/kg/dose intravenously or intramuscularly once per day (max 1,000 mg/dose)
	clindamycin[5]	10 mg/kg/dose orally three times per day (max 300 mg/dose)

1. Consider using amoxicillin alone as first line-antibiotic; however, if any of the following are present, prescribe amoxicillin + clavulanate:
   - Patient has used amoxicillin in the past 30 days
   - Patient has concurrent purulent conjunctivitis
   - Patient has a history of AOM that is refractory to amoxicillin treatment

2. Preferred amoxicillin to clavulanate ratio 14:1 (Extended Spectrum- ES: amoxicillin 600 mg + clavulanate 42.9 mg per 5 ml suspension or amoxicillin 1 g + clavulanate 62.5 mg tablet)

3. If child is able to swallow pills, cefpodoxime is preferred and generally more effective due to greater bioavailability. Check for availability.

4. If patient is allergic to cefdinir:
   - Confirm patient's reaction before altering therapy.
   - Consider azithromycin 10 mg/kg (max 500 mg) on day 1 and 5 mg/kg daily (max 250 mg) on days 2 – 5.

5. Add cefdinir to clindamycin if concerned about gram-negative organisms, (e.g. concurrent purulent conjunctivitis or history of AOM that is refractory to amoxicillin)

TABLE 2. Duration of antibiotics based on AOM characteristics and age of patient

AOM Characteristics	Age	Oral antibiotics	Ceftriaxone
AOM without spontaneous rupture of tympanic membrane	Age < 2 years	10 days	1 day[2]
	Age ≥ 2 years[1]	5 days	
AOM with otorrhea/spontaneous rupture of tympanic membrane	All ages	10 days	3 days
AOM after treatment failure (within 15 days of previous antibiotic treatment)	All ages	10 days	1 – 3 days[2]

1. The current AAP guidelines (2013) recommend a duration of 7 days of oral antibiotics for children ages 2 – 5 years of age presenting with AOM and no rupture of tympanic membrane.[1,8]

2. Ceftriaxone should be reserved for use as a second-line antibiotic or for patients with documented penicillin allergy. It should not be prescribed for reasons of convenience.

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Talking with patients

Providers may find it challenging to delay prescribing antibiotics due to patient or parent concerns. Research has identified effective communication strategies to address these concerns while maintaining patient satisfaction. Key concepts from these studies include[7].

- **Explaining why antibiotics are not needed**:
  - Antibiotics don't work on viruses.
  - Antibiotics can cause harm; only use when needed.
  - Antibiotic usage promotes antibiotic resistance.
- **Giving alternative treatment plan**. Recommend specific over-the-counter or home remedies that are effective for symptomatic relief (e.g. pain). See *Symptom-relief Checklist* and other patient education on pg 5.
- **Communicating specific contingency plans**. If A occurs — then execute B, based on likely events and the patient's specific concerns.
- **Considering delayed antibiotic prescription**
  - Allow patients to contact you if they have questions.
  - Set clear symptom/sign parameters for filling the prescription.

Observation / Delayed Antibiotic Prescription

In most instances, AOM resolves on its own without antibiotic treatment. The AAP guidelines recommend that a strategy of observation, also known as "watchful waiting" or "active monitoring," should be considered in lieu of immediate antibiotic treatment in specific circumstances. These include:

- Mild/moderate case of AOM in a child that is ≥2 years old
- Mild/moderate unilateral AOM in children age 6–23 months

Patients/parents are instructed to return for prescription or fill a delayed prescription if symptoms fail to improve, or worsen in 48–72 hours. Research indicates the use of delayed prescriptions significantly decreases antibiotic usage across multiple diseases in children, including those with AOM, and that parents have satisfaction levels that are similar to those that receive an antibiotic.[6]

Consider the following steps when choosing to delay antibiotic prescriptions:

- **Use a shared decision-making** process involving provider and parent. The box on the right contains useful strategies for discussing delayed antibiotics with parents.
- **Clearly communicate to parents the specific signs and symptoms to watch for** during observation period and details of recommended treatment of symptoms, including pain management.
- **Ensure follow-up plan** for patients that do not improve. Give a delayed antibiotic prescription that can be filled if the child's condition does not improve, or worsens in 48–72 hours. Make sure to include a start date and expiration date on the prescription so that it is only active during the observation window.

Special Populations

Patients with pressure equalization (PE) tubes

- AOM in a patient with PE tubes typically manifests with otorrhea. If AOM is suspected and no otorrhea is observed, tube may be occluded or dislodged.
- Ototopical antibiotics are recommended as first line antibiotics (without oral antibiotics) in a patients with PE tubes and uncomplicated otorrhea.
- Ofloxacin (0.3% otic solution) is recommended as first line treatment. Duration is typically 7–10 days.
- Oral antibiotics are recommended as second line treatment if any of the following:
  - Drainage persists or worsens after 7–10 days of ototopical antibiotics,
  - Severe infection (high fever or otalgia)
  - Complicated otorrhea (cellulitis or bacterial infection in sinuses, pharynx, or lungs)
  - Patient will not tolerate ototopical drops.
- Refer to ENT for severe infection not improving or otorrhea lasting >than 14 days.
- Consider removing the tubes after 2–3 years if present and the child has outgrown the need for tubes or if there is persistent otorrhea or granuloma.

Recurrent AOM

- DO NOT prescribe prophylactic antibiotics to reduce infection frequency.
- Refer for possible PE tubes after three AOM infections requiring antibiotics in six months or four in one year.

Patients with perforation

- Ototopical antibiotics not recommended. Prescribe oral antibiotics as needed.

AOM with conjunctivitis

- Topical antibiotics are not recommended. Prescribe oral antibiotics as needed.

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Prevention of AOM

During any visit related to ear infections, reinforce these prevention tips with parents:

- Breastfeed for first 6 months of life if possible.
- Quit smoking and limit child's exposure to other sources of secondhand smoke.
- Ensure up-to-date vaccinations particularly for organisms linked to AOM (e.g. *Influenza A*, *S. pneumoniae*, and *H. influenzae).* See vaccination schedule.
- Avoid supine bottle feeding.
- Practice good handwashing techniques.
- Avoid cleaning ears with cotton swabs or sharp objects.
- Control allergies. Chronic congestion from allergies can increase the likelihood of AOM.

Patient Education Resources

Intermountain patient / parent resources

Watchful waiting and delayed antibiotic prescriptions
Available in English and Spanish

Upper Respiratory Infection: Symptom relief checklist (0 – 12))
Available in English and Spanish

Upper Respiratory Infection: Symptom relief checklist (12+)
Available in English and Spanish

Pediatric Dosing Guide: Acetaminophen and Ibuprofen
Available in English and Spanish

Ear Infections
Pediatric and Adult education
Available in English and Spanish

Let's Talk About... Middle Ear Infection
Pediatric education
Available in English and Spanish

Colds and Coughs in Children and Adolescents: Managing Viral Infections
Available in English and Spanish

Kid's Health: Middle Ear Infections
Primary Children's Hospital's online resource available in English and Spanish

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This CPM presents a model of best care based on the best available scientific evidence at the time of publication. It is not a prescription for every physician or every patient, nor does it replace clinical judgment. All statements, protocols, and recommendations herein are viewed as transitory and iterative. Although physicians are encouraged to follow the CPM to help focus on and measure quality, deviations are a means for discovering improvements in patient care and expanding the knowledge base.

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