



# DIAGNOSIS AND MANAGEMENT OF Pediatric Acute Otitis Media (Ear Infection)

2019  
(Minor update 2023)

This care process model (CPM), produced by Intermountain Healthcare's Antibiotic Stewardship team, Community-Based Care, and Intermountain Pediatrics, is based on the American Academy of Pediatrics (AAP) Clinical Practice Guidelines.<sup>AAP</sup> This CPM provides best-practice recommendations for diagnosis and management of acute otitis media (AOM), including guidance for appropriate use of antibiotics.

## ► Why Focus on Acute Otitis media (ear Infection)?

Antibiotics are commonly overprescribed for acute otitis media. Antibiotics are often prescribed for AOM. When strict diagnostic criteria are not used, children may be prescribed antibiotics inappropriately.<sup>VEN</sup>

With growing concern over antibiotic resistance among pathogens causing AOM, antibiotic choices are not always clear.<sup>COG</sup> Despite recommendations of decreased use by the AAP and American Association of Family Practitioners in 2004 (and updated in 2013), antibiotic dispensing for AOM remains high.<sup>MCG</sup>

Most cases of AOM resolve without antibiotics. According to a systematic literature review, symptoms improved without antibiotics in 61% of children within 24 hours and 80% of children within two to three days.<sup>ROS</sup>

### Key Recommendations

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

- Only diagnose AOM if exam and symptoms meet criteria ([see page 2](#)).
- If diagnosing otitis media with effusion (OME), DO NOT prescribe antibiotics. They do not help OME heal faster. Antibiotics increase costs, risk of antibiotic resistance, and patient exposure to unnecessary side effects.<sup>AAP</sup>
- To reduce antibiotic resistance, DO NOT prescribe antibiotics for uncomplicated AOM. 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 and in children 6–23 months with mild/moderate unilateral AOM.<sup>AAP-</sup>
- Shared decision-making may lead to less antibiotic usage. Educating parents about all treatments including observation and delayed antibiotic prescriptions as alternatives to immediate antibiotic therapy can lead to less antibiotic usage.<sup>MER</sup>
- Azithromycin is not recommended for treatment of AOM due to widespread antibiotic resistance in pathogens that commonly cause it.
- Antibiotic treatment duration should be based on severity and age.<sup>HOB</sup> See new duration recommendations [pg 5](#).

## What's inside?

Diagnosis of Acute Otitis Media .....	2
Management and Treatment of Acute Otitis Media .....	4
Table 1: Recommended Antibiotic Therapy for AOM .....	5
Resources .....	6
References .....	7

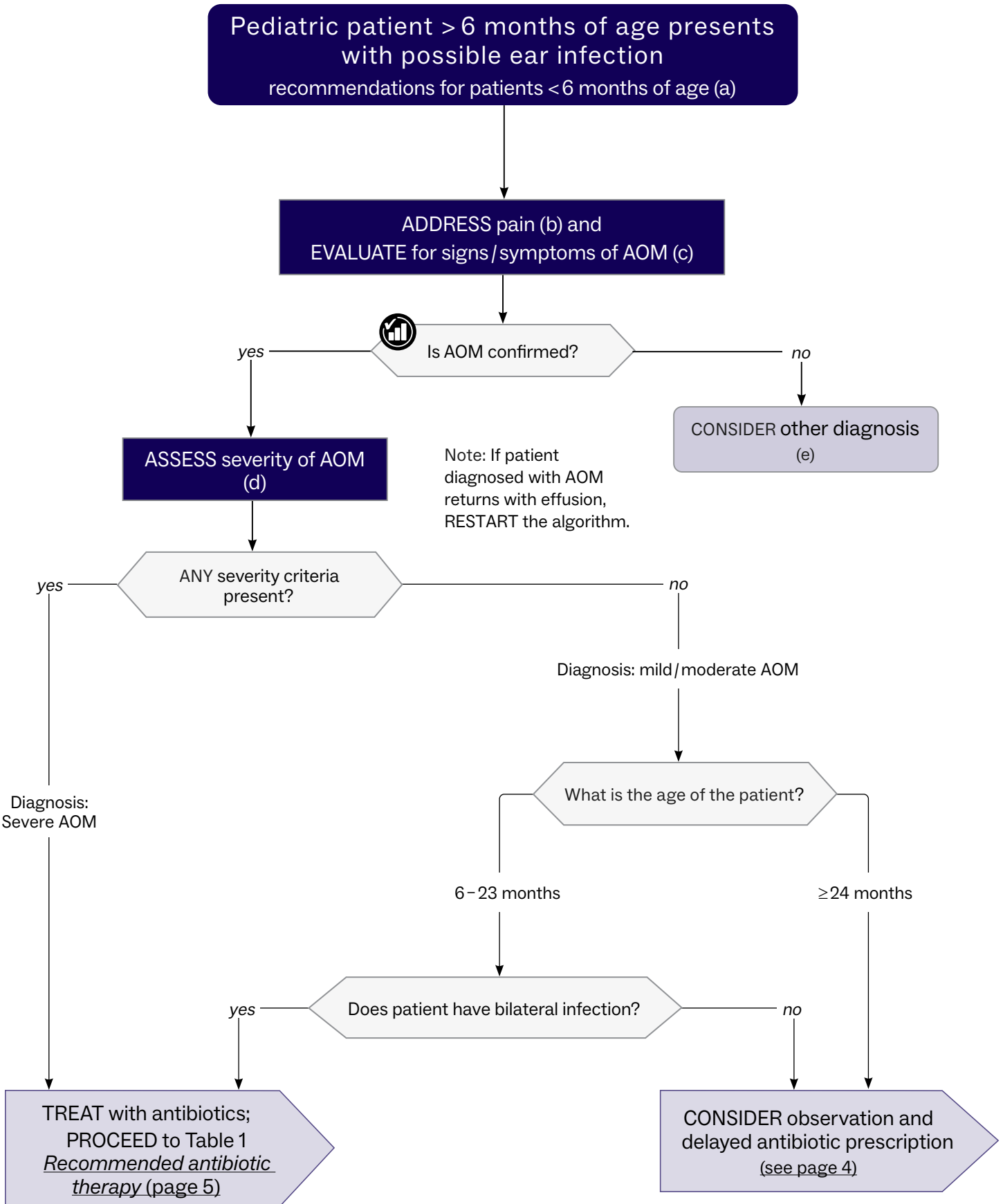
## GOALS & MEASUREMENTS


The goal of this CPM is to improve the outcomes of pediatric patients with AOM and decrease the spread of antibiotic resistance by addressing the following:

- Improve AOM diagnostic accuracy
- Select appropriate antibiotics
- Reduce unnecessary use of antibiotics
- Appropriate use of observation and delayed prescriptions



# DIAGNOSIS OF ACUTE OTITIS MEDIA (PEDIATRIC)



 Indicates an Intermountain measure

## 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.

## ALGORITHM NOTES

### (a) Patients <6 months of age

Research is limited in children <6 months of age and guidelines do not directly address this age group. In general practice, most physicians recommend treating cases of AOM in children <6 months of age with standard antibiotics ([see Table 1: Recommended antibiotic therapy for acute otitis media on page 5](#)).

### (b) Addressing pain

Pain can be severe in AOM and should be managed whether or not antibiotics are prescribed. If observing patient with delayed prescription or immediately prescribing antibiotics, consider recommending analgesics such as ibuprofen or acetaminophen for symptomatic relief (antibiotics do not relieve pain in the first 24 hours). Relief is often brief; continue analgesics as long as necessary.

In preverbal children pain often presents as:

- Holding, tugging, or rubbing ear
- Excessive crying
- Changes in the child's sleep or behavior patterns

### (c) AOM diagnostic criteria<sup>AAP</sup>

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 (PE) tubes will not have a bulging TM

### (d) Severe AOM criteria<sup>AAP</sup>

Consider severe AOM if ANY of the following are present:

- Temperature  $\geq 102.2^{\circ}\text{F}$  ( $39^{\circ}\text{C}$ )
- Moderate/severe otalgia
- Otagia for >48 hours
- Otorrhea

### (e) Otitis media with effusion (OME) vs. AOM<sup>AAP</sup>

Consider the following when dealing with patients that present with OME but do not fit AOM criteria:

- OME is common and often long-lasting in the aftermath of 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.

## COUNSELING WITH PATIENTS ABOUT DELAY OF ANTIBIOTICS

Clinicians often find difficulty postponing the prescription of antibiotics, even when clinically desired, due to patient/parent concerns. Several studies have identified strategies for talking with patients/families while still maintaining their satisfaction. Several key concepts have emerged from this research. They are listed below<sup>FLE</sup>.

- Explain to your patients why antibiotics are not needed.
  - Antibiotics don't work on viruses.
  - Antibiotics can cause harm; only use when needed.
  - Antibiotic usage promotes antibiotic resistance.
- Give patients an alternative treatment plan.
  - Recommend specific over-the-counter or home remedies that are effective for symptomatic relief (e.g. pain). See patient education materials on [page 6](#).
- Communicate specific contingency plans to patients.
  - If A occurs — then execute B, based on likely events and the patient's specific concerns.
- Consider delayed antibiotic prescription
  - Set clear symptom/sign parameters for filling the prescription.
  - Allow patients to contact you if they have questions.

## ► MANAGEMENT AND TREATMENT OF AOM

### Observation and 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  $\geq 2$  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. Some examples of delayed prescription programs include “safety net antibiotic prescriptions” (SNAP) and “wait-and-see prescriptions” (WASP). 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.<sup>KIN</sup>

Consider the following steps when choosing to delay antibiotic prescriptions:

- Use a shared decision-making process involving provider and parent. The side bar on the left 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.

### Immediate treatment with antibiotics

Use TABLE 1 ([page 5](#)) to determine appropriate antibiotics and TABLE 2 ([page 5](#)) for recommendations on duration. Special considerations for treating patients with pressure equalization tubes and recurrent AOM are discussed in the paragraphs below and on the next page.

### Treating patients with pressure equalization (PE) tubes

When treating patients with AOM that have PE tubes use the following guidelines:

- AOM in a patient with PE tubes typically manifests with otorrhea. If AOM is suspected and no otorrhea is observed, then the tube may be occluded or dislodged.
- Otological 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 before Ciprodex in most situations due to cost. 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 otological antibiotics,
  - Severe infection (high fever or otalgia)
  - Complicated otorrhea (cellulitis or bacterial infection in sinuses, pharynx, or lungs)
  - Patient will not tolerate otological drops.
- Refer to ENT for severe infection not improving or otorrhea persisting more 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

Some children have recurring episodes of AOM. The following recommendations apply:

- 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.

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

	Drug	Dose and frequency
NO penicillin allergy	<b>First-line antibiotics</b>	
	amoxicillin <sup>1</sup>	45mg/kg/dose orally two times per day (max 2g/dose)
	amoxicillin + clavulanate <sup>1</sup>	45mg amox/kg/dose orally two times per day (max 2g amox/dose)
	<b>Second-line antibiotics</b>	
	ceftriaxone	50 mg/kg/dose intravenously or intramuscularly once per day (max 1,000 mg/dose)
	clindamycin with or without cefdinir	10 mg clindamycin /kg/dose orally three times per day (max 300 mg/dose)
	cefdinir	14 mg cefdinir /kg/dose orally once per day (max 600mg/dose)
YES penicillin allergy	<b>First-line antibiotic</b>	
	cefdinir <sup>3</sup>	14 mg/kg/dose orally once per day (max 600mg/dose)
	<b>Second-line antibiotics</b>	
	ceftriaxone	50 mg/kg/dose intravenously or intramuscularly once per day (max 1,000 mg/dose)
	clindamycin	10 mg/kg/dose orally three times per day (max 300mg/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. Add cefdinir to clindamycin if concerned about gram-negative organisms, (e.g. concurrent purulent conjunctivitis or history of AOM that is refractory to amoxicillin)

3. If patient is allergic to cefdinir:

- Confirm patient's reaction before altering therapy.
- Consider clindamycin; add trimethoprim (TMP)/sulfamethoxazole 3–5mg TMP/kg/dose orally two times per day (max 160 mg TMP/dose) if patient has not improved in 48 hours.

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

AOM Severity	Age	Recommended oral antibiotics	Ceftriaxone
Severe AOM	Age 0 – 18 years	10 days	3 days
Mild/moderate AOM	Age <2 years	10 days	3 days
	Age 2 – 5 years	7 days	
	Age >5 years	5 days	

## ► Resources

### Intermountain patient / parent resources

Access patient education handouts at [Intermountainhealthcare.org](https://www.intermountainhealthcare.org). You can order patient education handouts using Print It! at Intermountain's Design and Print Center for one-stop access and ordering for Intermountain-approved education, such as fact sheets, booklets, and trackers.

#### [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

## ANTIBIOTIC STEWARDSHIP TEAM

- Whitney Buckel, PharmD
- Adam Hersh, MD, PhD
- Jeremy Meier, MD
- Jared Olson, PharmD
- Michelle Pahl, MD
- Heidi Porter, PhD (Medical Writer)
- Jenna Stallsmith, PharmD
- Eddie Stenehjem, MD, MSc
- Emily Thorell, MD, MSc

## ► References

- AAP 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.
- COC Coco A, Vernacchio L, Horst M, and Anderson A. Management of acute otitis media after publication of the 2004 AAP and AAFP clinical practice guidelines. *Pediatrics*. 2010;125(2):214-220.
- FLE Fleming-Dutra KE, Mangione-Smith R, Hicks LA. How to prescribe fewer unnecessary antibiotics: talking points that work with patients and their families. *Am Fam Physician*. 2016;94(3):200-202.
- HOB Hoberman A, Paradise JL, Rockette HE, et al. Shortened antimicrobial treatment for acute otitis media in young children. *NEJM*. 2016;375:2446-2456.
- KIN King L, Fleming-Dutra K, Hicks L. Advances in optimizing the prescription of antibiotics in outpatient settings. *BMJ*. 2018;363:k3047.
- MCG McGrath LJ, Becker-Dreps S, Pate V, Brookhart MA. Trends in antibiotic treatment of acute otitis media and treatment failure in children, 2000-2011. *PLoS ONE*. 2013;8(12):e81210.
- MER Merenstein D, Diener-West M, Krist A, Pinnegar M, Cooper LA. An assessment of the shared-decision model in parents of children with acute otitis media. *Pediatrics*. 2005;116(6):1267-1275.
- ROS Rosenfeld RM, Kay D. Natural history of untreated otitis media. *Laryngoscope*. 2003;113(10):1645-1657. Review.
- VEN Venekamp RP, Sandrs SL, GLasziou PP, Del Mar CB, Rovers MM. Antibiotics for acute otitis media in children (Review). *Chochrane Database of Systematic Reviews*. 2015;66 Art. No.:CD000219
- VER Vernacchio L, Vezina RM, Mitchell AA. *Management of Acute Otitis Media by Primary Care Physicians: Trends Since the Release of the 2004 American Academy of Pediatrics/American Academy of Family Physicians Clinical Practice Guidelines*. <http://pediatrics.aappublications.org/content/120/2/281.long>. Accessed September 19, 2017.

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.

Send feedback to Whitney Buckel PharmD, System Antimicrobial Stewardship Pharmacist Manager; Intermountain Health. ([whitney.buckel@imail.org](mailto:whitney.buckel@imail.org))