



BOTTOM LINE RECOMMENDATIONS:

Acute Otitis Media

Acute otitis media (AOM) is a common, symptomatic infection of the middle ear. Nasopharyngeal secretions that contain viruses and bacteria can enter the middle ear via the eustachian tube. Usually the middle ear drains well but if there is eustachian tube swelling, fluid from the middle ear may not drain properly. Under these conditions bacteria and viruses present in the middle ear can multiply, creating clinical AOM. The majority of bacterial otitis media in children under one year occur within one month of a clinically significant upper respiratory tract infection¹.

DIAGNOSIS

AOM presents with recent (one to several days) onset of symptoms. Often, especially in pre-verbal children, these symptoms are non-specific (such as fever, crying or irritability) and can be similar to other viral or bacterial infections. Therefore, diagnosis rests on a detailed examination of the middle ear to identify whether or not there is probable bacterial infection in the middle ear, irrespective of the presence of fever at time of presentation.

» The two required criteria for AOM are:

1) Presence of a middle ear effusion as evidenced by:

- a full or bulging tympanic membrane (TM) **-OR-**
- loss of bony landmarks or presence of an air-fluid level on the TM **-OR-**
- absent or significant decreased motility of the TM with a pneumatic otoscope

2) Signs of inflammation in the middle ear:

- distinct intense erythema or hemorrhagic patches over a bulging TM **-OR-**
- yellow TM

- » An acutely **ruptured TM** in the setting of acute otitis media should always be presumed to be caused by a bacteria (usually Group A streptococcus) and treated with antimicrobials. A bacterial culture should be done if pus is present in the ear canal.
- » **AOM should be distinguished from chronic suppurative otitis media** (>3 weeks of painless otorrhea without acute symptoms) through a previously ruptured TM or a myringotomy tube. In these cases, cultures of the fluid should be obtained to direct therapy. Topical therapy or systemic therapy can be prescribed empirically depending on the clinical severity of illness pending culture results. If symptoms persist despite treatment, children should be referred to otolaryngology as there is a risk of chronic mastoiditis

THE FOLLOWING SIGNS ARE NOT CONSISTENT WITH THE DIAGNOSIS OF AOM

- » Chronic ear drainage
- » Isolated erythema or opacity of TM
- » TM with limited mobility but no evidence of inflammation
- » Retracted or neutral position of TM

DECIDING WHO REQUIRES IMMEDIATE TREATMENT WITH ANTIBIOTICS

MILD SYMPTOMS

- » AOM associated with mild symptoms will often resolve spontaneously and should not be unnecessarily treated with antibiotics. Overuse of antibiotics for this condition could lead to an increase in bacterial resistance and may subject the child to unnecessary side effects from antibiotics.
- » Children > 6 months who are **mildly ill** (e.g. alert, responsive, responding well to analgesia) with illness that is of short duration (**<48 hours**), with a temperature **<39° C**, can be observed for 24 - 48 hrs to see if symptoms resolve on their own. Ensure dialogue with caregivers to discuss monitoring and ongoing care or follow-up with a healthcare provider.

MODERATE OR SEVERE SYMPTOMS

The following are not likely to respond to conservative measure and should be treated with antibiotics to relieve symptoms and prevent complications:

- » Children who are **moderately or severely ill** (e.g. difficulty sleeping, severe pain, **temperature $\geq 39^{\circ}$ C**, poor feeding and/or irritable) or who have already been **ill for >48 hours**.
- » Children who have an **acutely perforated TM** (pus noted in the ear canal or perforation seen on examination) should be treated with antibiotics. Most of these cases will be caused by *S. pyogenes* (Group A streptococci) but a culture of the fluid from the ear is useful to direct therapy, especially if they have received prior antibiotics and infection is persistent.



TREATMENT OF INITIAL, UNCOMPLICATED AOM

- » There is **NO** evidence to support the use of topical antibiotics for treatment of acute AOM as they do not provide an added benefit even in the setting of an acute perforation. If there is chronic drainage, the diagnosis of chronic suppurative otitis media must be considered. (See “Diagnosis” section above).
- » **It is important to manage the child’s pain while treatment is underway:** ibuprofen is preferred (10 mg/kg/dose every 6 hours; max 4 doses per day). Second line treatment of oral acetaminophen (15 mg/kg/dose every 4 hours; max 4 doses per day). With effective treatment of AOM, most children will not need pain medication beyond 24-36 hours.
- » Since most cases of AOM are due to *S. pneumoniae* and Group A streptococci, amoxicillin is the drug of choice as **initial treatment**. Amoxicillin achieves good concentrations in the middle ear when given at recommended doses.

DOSE AND DURATION

- » Amoxicillin: 45 to 60 mg/kg/day divided TID **-OR-** 75-90 mg/kg/day divided BID.
 - » Children < 2 years of age – 10 days
 - » Children ≥ 2 years of age – 5 days

WHAT TO DO WITH A SUSPECTED HISTORY OF POSSIBLE PENICILLIN ALLERGY

- » Verify that the history is consistent with IgE-mediated penicillin allergy (anaphylaxis, hypotension, urticaria and/or angioedema).
- » If so, give cefuroxime-axetil, 30 mg/kg/day divided BID or TID for 5 or 10 days (as age appropriate) **-OR-** ceftriaxone – 50 mg/kg intramuscularly (or intravenously) daily for 3 days.

TREATMENT OF AOM THAT FAILS TO RESPOND TO AMOXICILLIN THERAPY

- » Children who have bacterial AOM should be at least somewhat better within 24 hours and usually have resolved symptoms within two or three days of starting antibiotics. If this does not occur, the patient should be reassessed to detect complications or failure of initial treatment.
- » **Verify diagnosis and ensure that no complications have developed.**
- » Discontinue amoxicillin and start amoxicillin-clavulanate (7:1 formulation):
 - » Child weight ≤ 35 kg: amoxicillin-clavulanate suspension 45 - 60 mg/kg/day of amoxicillin component divided TID orally for **10** days
 - » Child weight >35 kg: amoxicillin- clavulanate 45 - 60 mg/kg/day of amoxicillin component given as 500 or 875 mg tablet of TID orally, for **7-10** days

COMPLICATIONS DUE TO AOM

- » Complicated AOM can develop if infections of the middle ear spread to adjacent structures. As such, the presence or absence of complications should be documented **at diagnosis and may require assessment by an otolaryngologist or hospital admission.**
- » **Acute mastoiditis** manifests as pain and/ or swelling over the mastoid bone. There can be associated petrous bone inflammation that causes unilateral **facial palsy** (seventh cranial nerve) and/or **diplopia** on lateral gaze (sixth cranial nerve palsy).
- » **Venous sinus thrombosis** or **meningitis** can manifest as a persistent or severe headache and/or cranial nerve palsies. These diagnoses will require separate considerations for medical and surgical management.

The purpose of this document is to provide health care professionals with key facts and recommendations for the diagnosis and treatment of acute otitis media in children in the emergency department. This summary was produced by the acute otitis media content advisor for the TREKK Network, Dr. Nicole Le Saux of the Children's Hospital of Eastern Ontario, and uses the best available knowledge at the time of publication. However, healthcare professionals should continue to use their own judgment and take into consideration context, resources and other relevant factors. The TREKK Network is not liable for any damages, claims, liabilities, costs or obligations arising from the use of this document including loss or damages arising from any claims made by a third party. The TREKK Network also assumes no responsibility or liability for changes made to this document without its consent. This summary is based on:

1. [Chonmaitree T et al. Symptomatic and asymptomatic respiratory viral infections in the first year of life: Association with acute otitis media development. Clin Infectious Disease 2015 Jan 1;60\(1\): 1-9.](#)
2. [Le Saux N, Robinson JL. Management of acute otitis media in children six months of age and older. Paediatr Child Health 2016;21:39–50.](#)
3. [Hoberman A, Paradise JL, Rockette HE, Shaikh N, Wald ER, Kearney DH, et al. Treatment of acute otitis media in children under 2 years of age. N Engl J Med 2011;364:105–15.](#)
4. Shaikh N, Hoberman A, Kaleida P, Ploof D, Paradise J. Diagnosing Otitis Media - Otoscopy and Cerumen Removal <http://www.neim.org/doi/full/10.1056/NEJMvcm0904397>. N Engl J Med 2010;362:e62.
5. [Tähtinen PA, Laine MK, Huovinen P, Jalava J, Ruuskanen O, Ruohola A. A placebo-controlled trial of antimicrobial treatment for acute otitis media. N Engl J Med 2011;364:116–26.](#)
6. [Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. BMJ 2010;340:c2096.](#)
7. [Venekamp RP, Sanders SL, Glasziou PP, Del Mar CB, Rovers MM. Antibiotics for acute otitis media in children. Cochrane Database Syst Rev 2015;CD000219.](#)

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