





**Texas Children's  
Hospital**

# Ear Infections 101: 2019 Update

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## Objectives

- Common clinical scenarios, review the highest available level of evidence and most recent clinical practice guidelines

### Key Points:

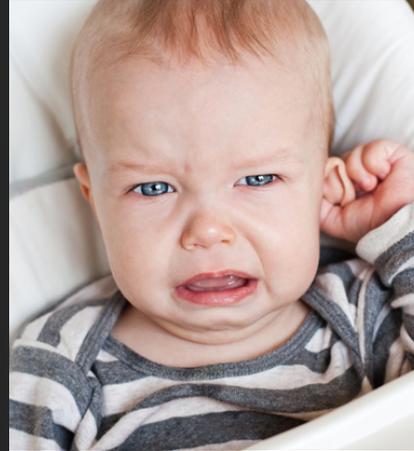
- Accurate diagnosis of acute otitis media
- Recommendations for initial ATB therapy and failure
- When to refer patients with chronic ME disease
- Treatment of tympanostomy tube otorrhea

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## Clinical Vignette

13-month old male with 2-day history of nasal congestion, coryza, cough, fever (39°C), irritability and decreased appetite

**Medical Hx:** Attends daycare, father smokes "outside the house". 3 episodes of acute OM in the previous 6 months. Last one treated with AMX 2 weeks ago



## Questions to Consider

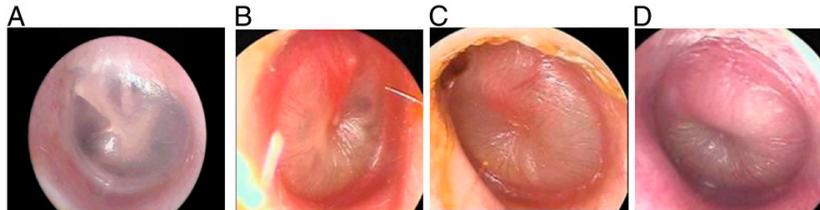
- Ear infection? Otitis media?
- Treatment? Watchful waiting?
- Most likely organism(s)? Choice of ATB therapy?
- If failure, what next?
- When to follow-up?
- When to refer? Alternative therapies?

CLINICAL PRACTICE GUIDELINE

American Academy of Pediatrics 

# The Diagnosis and Management of Acute Otitis Media

*Pediatrics* 2013;131:e964–e999



- Accurate diagnosis of AOM in infants and young children is an art!
- Cerumen, lack of cooperation, changes in the TM may be subtle
- Complicating factors: less than optimal diagnostic equipment, lack of a pneumatic bulb; inadequate instruments for clearing; inadequate assistance for restraining the child; lack of experience in removing cerumen and performing pneumatic otoscopy



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CLINICAL PRACTICE GUIDELINE

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## The Diagnosis and Management of Acute Otitis Media

*Pediatrics* 2013;131:e964–e999

Age	Otorrhea With AOM <sup>a</sup>	Unilateral or Bilateral AOM <sup>a</sup> With Severe Symptoms <sup>b</sup>	Bilateral AOM <sup>a</sup> Without Otorrhea	Unilateral AOM <sup>a</sup> Without Otorrhea
6 mo to 2 y	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy or additional observation
≥2 y	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy or additional observation	Antibiotic therapy or additional observation <sup>c</sup>

<sup>a</sup> Applies only to children with well-documented AOM with high certainty of diagnosis (see Diagnosis section).

<sup>b</sup> A toxic-appearing child, persistent otalgia more than 48 h, temperature  $\geq 39^{\circ}\text{C}$  ( $102.2^{\circ}\text{F}$ ) in the past 48 h, or if there is uncertain access to follow-up after the visit.



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## Microbiology

1. 66% bacteria and viruses together, 27% bacteria alone, and 4% virus alone<sup>1</sup>
2. *S. pneumoniae*, *H. influenzae*, *M. catarrhalis*, >> *S. pyogenes*
3. Changes in relative frequency over time after introduction of PCV-7 and later PCV-13
4. Rise in *S. pneumoniae* with intermediate and high resistance to PCN

Ruohola A et al. Microbiology of acute otitis media in children with tympanostomy tubes: prevalences of bacteria and viruses. *Clin Infect Dis*. 2006; 43(11):1417–1422



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CLINICAL PRACTICE GUIDELINE

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## The Diagnosis and Management of Acute Otitis Media

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### Initial Immediate or Delayed Antibiotic Treatment

Recommended First-line Treatment	Alternative Treatment (if Penicillin Allergy)
Amoxicillin (80–90 mg/kg per day in 2 divided doses)	Cefdinir (14 mg/kg per day in 1 or 2 doses)
or	Cefuroxime (30 mg/kg per day in 2 divided doses)
Amoxicillin-clavulanate <sup>a</sup> (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate [amoxicillin to clavulanate ratio, 14:1] in 2 divided doses)	Cefpodoxime (10 mg/kg per day in 2 divided doses)
	Ceftriaxone (50 mg IM or IV per day for 1 or 3 d)



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CLINICAL PRACTICE GUIDELINE

## The Diagnosis and Management of Acute Otitis Media

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### No symptomatic improvement within 48-72 hours

#### Antibiotic Treatment After 48–72 h of Failure of Initial Antibiotic Treatment

Recommended First-line Treatment	Alternative Treatment
Amoxicillin-clavulanate <sup>a</sup> (90 mg/kg per day of amoxicillin, with 6.4 mg/kg per day of clavulanate in 2 divided doses)	Ceftriaxone, 3 d Clindamycin (30–40 mg/kg per day in 3 divided doses), with or without third-generation cephalosporin
or	Failure of second antibiotic
Ceftriaxone (50 mg IM or IV for 3 d)	Clindamycin (30–40 mg/kg per day in 3 divided doses) plus third-generation cephalosporin
	Tympanocentesis <sup>b</sup>
	Consult specialist <sup>b</sup>



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## When to Follow-up

- If symptoms improved, little support for routine 10-14 day re-check. Clinician may reassess young children with severe symptoms or recurrent AOM or when specifically requested by the child's parent
- Residual MEE common, no additional ATB needed:
  - 60-70% at 2 weeks
  - 40% at 1 month
  - 10-25% at 3 months<sup>1</sup>

1. Shurin PA, Pelton SI, Donner A, Klein JO. Persistence of middle-ear effusion after acute otitis media in children. N Engl J Med. 1979;300(20):1121-1123



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## When to Refer

- Persistent acute otitis media not responsive to appropriate ATB therapy
- Recurrent Acute Otitis Media (RAOM): 3 infections in 6 months, 4 infections in 12 months (1 recent)
- Persistent MEE for >3 months: Chronic Otitis Media with Effusion

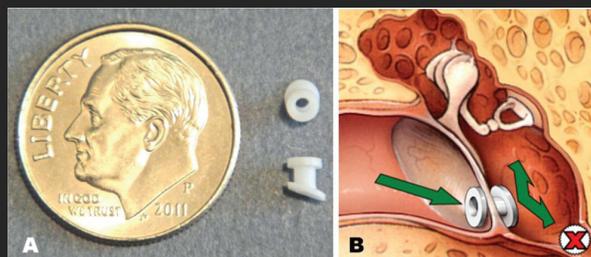


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## An Ounce of Prevention...

- Pneumococcal vaccine
- Influenza vaccine
- Exclusive breastfeeding x 6 months
- Avoidance of smoke exposure
- Lifestyle changes: pacifier, bottle, child care-center attendance patterns. Xylitol?

## Tympanostomy Tubes



## Clinical Vignette

2 year-old male, with bilateral otorrhea starting one day ago, a week of upper respiratory respiratory infection symptoms. 3 episodes in 3 months, last time 2 weeks ago.

**Medical Hx:** H/o recurrent otitis media, tympanostomy tubes placed at other hospital not with TCH-Otolaryngology



## Questions

- Ear infection? Is there a way to prevent?
- Most likely organism(s)?
- Choice of ATB therapy? Topical? Systemic? Both?
- If failure, what next?
- How to prevent it?

# Prevention of TTO

## Limiting Water Exposure

Conclusion	Strength of Evidence	Comments
Effectiveness of earplugs or avoidance of swimming. Neither use of ear plugs nor avoidance of swimming reduces the risk of otorrhea.	Low	Limited number of studies (2 RCTs) Meta-analysis of 7 NRCSs with high risk of bias

**Prevention and Treatment of Tympanostomy Tube Otorrhea:  
A Meta-analysis**

Dale W. Steele, MD, MS,<sup>a,b,c,d</sup> Gaelen P. Adam, MLIS,<sup>a</sup> Mengyang Di, MD, PhD,<sup>a</sup> Christopher W. Halladay, ScM,<sup>a</sup> Ethan M. Balk, MD, MPH,<sup>a,b</sup> Thomas A. Trikalinos, MD, PhD<sup>a,b</sup>

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# Prevention of TTO

## Tube Design

Conclusion	Strength of Evidence	Comments
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## Tympanostomy Tube Otorrhea (TTO)

- 52% of children experience  $\geq 1$  episodes of TTO after tube placement
- Cultures: ME pathogens and EAC skin colonizers non-typeable *H. influenza*, *S. pneumoniae*, and *M. catarrhalis*, *S. aureus* and *P. aeruginosa*

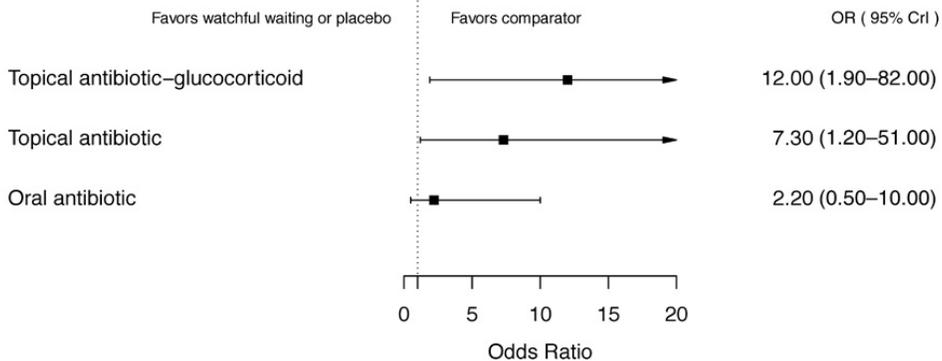
van Dongen T et al. Parent-reported otorrhea in children with tympanostomy tubes: incidence and predictors. PLoS One. 2013;8(7):e69062



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## Relative Effectiveness of Interventions Compared with Watchful Waiting or Placebo Therapy

### Comparators



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## Facts to Consider

- ATB ear drops reach very high-drug concentrations, low or absent serum drug concentrations: less likely to cause resistance as compared with oral antibiotics
- Ototoxicity: quinolones only topical ATB approved for use with non-intact TMs
- Higher efficacy of steroid combination: adjuvant anti-inflammatory effect
- Cost: Ciprofloxacin + Dexamethasone combination drop vs ciprofloxacin or ofloxacin only



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## Key Points

- Accurate diagnosis of acute otitis media
- Recommendations for initial ATB therapy and failure
- When to refer patients with chronic ME disease
- Treatment of tympanostomy tube otorrhea



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