

Otitis Media: Pediatric

Ears, Eyes, Nose, Throat and Mouth

Clinical Decision Tools for RNs with Additional Authorized Practice [RN(AAP)s]

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Background

Acute otitis media (AOM), also referred to as suppurative otitis media (OM) or purulent OM, is an inflammation of the structures of the middle ear characterized by the presence of pus in the middle ear in association with local or systemic infection (viral or bacterial) (Huether & Rodway, 2019; Porter, Dunphy, & Reinoso, 2019). Acute otitis media is more common in children, with approximately 75% experiencing at least one episode of AOM by the age of three years (Huether & Rodway, 2019; Porter et al., 2019). Young children are more prone to AOM because of their shorter and more horizontal eustachian tubes, allowing pathogens to move from the nasopharynx to the middle ear (Sakulchit & Goldman, 2017).

Respiratory viral pathogens account for up to 50% of AOM cases (Porter et al., 2019). According to Porter and colleagues (2019), bacterial organisms include *Streptococcus pneumoniae*, *Moraxella catarrhalis*, *Haemophilus influenzae*, *Staphylococcus aureus*, *Mycoplasma* and *Chlamydia pneumoniae* (less common), and *Chlamydia trachomatis* (only in infants less than six months of age) (Huether & Rodway, 2019; Porter et al., 2019).

Other types of OM include otitis media with effusion (OME) and chronic OM (Huether & Rodway, 2019; Porter et al., 2019). OME is presence of fluid in the middle ear without symptoms of acute infection (Huether & Rodway, 2019). Causes of OME include recent viral upper respiratory tract infection (URTI), or acute allergy attack (Porter et al., 2019). Chronic OM is persistent (greater than three months) or recurring infection of the middle ear (Huether & Rodway, 2019; Porter et al., 2019). Bacterial pathogens responsible for chronic OM include any of the pathogens associated with AOM, as well as *Escherichia coli*, *Proteus*, *Pseudomonas aeruginosa*, or *Staphylococcus aureus* (Porter et al., 2019).

Immediate Consultation Requirements

The RN(AAP) should seek immediate consultation from a physician/NP when any of the following circumstances exist: toxic-appearing infant or child, may be pale or cyanotic and is often lethargic or inconsolably irritable. In addition, tachypnea and tachycardia with poor capillary refill may be present;

- signs of meningeal irritation;
- mastoid process erythema, tenderness, swelling with fever, and protrusion of pinna;
- facial nerve palsy;
- lateral neck abscess;
- another bacterial infection is present;
- immunocompromised client;
- less than six months of age;
- failure of second round of antibiotic therapy;
- children who have frequent AOM (usually more than three episodes in six months or four episodes over a year period); and/or
- lethargy (Interprofessional Advisory Group [IPAG], personal communication August 28, 2019).

Predisposing and Risk Factors

Predisposing and risk factors for OM in pediatric clients include:

- age three months to three years,
- supine bottle feeding,
- formula feeding during the first six months of age,
- continued pacifier use after six months of age,
- eustachian tube dysfunction (due to allergies, sinusitis, rhinitis, or pharyngitis),
- recent or concurrent URTI,
- perforated tympanic membrane (TM) (due to direct blunt trauma, swimming or diving accidents),
- immunosuppression,
- exposure to second-hand smoke,
- Down syndrome,
- daycare attendance,
- crowded or unsanitary living conditions,
- poverty
- exposure to wood-burning stoves,
- fall and winter months,
- male gender,
- craniofacial abnormalities (related to cleft palate, deviated nasal septum, or nasopharyngeal tumours), and/or
- family history of OM (Anti-infective Review Panel, 2019; Porter et al., 2019; Coleman, Wood, Bialasiewicz, Ware, Marsh, & Cervin, 2018).

Health History and Physical Exam

Subjective Findings

The circumstances of the presenting complaint should be determined. These may include:

- otalgia (pain is absent in 20% of children);
- otorrhea;
- fever;
- irritability;
- tugging, rubbing, or holding of the ear;
- vomiting or diarrhea;
- restless sleep;
- history of URTI or recurrent AOM; and/or
- lethargy and anorexia (Porter et al., 2019; Sakulchit & Goldman, 2017).

Clients with OME typically present with the following complaints:

- absence of pain and fever;
- recent history of URTI or allergic rhinitis;
- sensation of ear fullness;
- ear popping, crackling, or gurgling sounds;
- decreased hearing acuity; and/or
- vertigo (rare) (Porter et al., 2019).

Clients with chronic OM typically present with the following complaints:

- history of repeated AOM,
- period of continuous or intermittent otorrhea for three months or more,
- hearing loss on the affected side, and/or
- pain (not common) (Porter et al., 2019).

Objective Findings

The signs and symptoms of OM in the pediatric client may include:

- fever;
- acutely ill appearance;
- absence of erythema or swelling of external ear canal;
- red, dull, cloudy or yellow TM, often bulging and opaque;
- obscured or inability to visualize bony landmarks in middle ear;
- absence of cone of light reflex;
- purulent or mucoid discharge in the external ear canal if the TM is perforated;
- decreased mobility of the TM;

- bullae seen on TM (only in cases of Mycoplasma infection);
- enlarged and tender preauricular and posterior cervical nodes; and/or
- conductive hearing loss (Porter et al., 2019).

Redness of the TM in the absence of other signs may be due to crying, agitation, a common cold, aggressive examination or manipulation of the external ear canal, myringitis, or OME (Porter et al., 2019).

Differential Diagnosis

The following should be considered as part of the differential diagnosis:

- OME,
- chronic OM,
- acute otitis externa,
- temporomandibular joint syndrome,
- trauma to or foreign body in ear canal,
- referred pain from dental abscess,
- mastoiditis (rare),
- parotitis,
- transient middle ear effusion (due to air travel or altitude changes),
- eustachian tube disorders or nasopharyngeal pathology,
- allergic rhinitis, and
- myringitis (Porter et al., 2019).

Making the Diagnosis

Acute otitis media in children can be diagnosed if there is middle ear effusion with signs of middle ear inflammation on otoscopic exam such as:

- moderate or severe TM bulging on otoscope exam,
- new onset of otorrhea not caused by otitis externa, or
- mild bulging of the TM associated with recent onset of otalgia (within the last 48 hours) and/or erythema (Sakulchit & Goldman, 2017).

Investigations and Diagnostic Tests

Investigations and diagnostic tests are not typically required if the history and physical examination support the diagnosis of OM (Porter et al., 2019).

Management and Interventions

Goals of Treatment

The primary goals of immediate treatment are to relieve pain and fever, eradicate infection, prevent complications and avoid unnecessary use of antibiotics to reduce antibiotic resistance. The

majority of uncomplicated cases of OM are self-limiting (up to 82%) and may not require specific interventions other than pain control and symptomatic treatment (RxFiles Academic Detailing Program, 2021; Porter et al., 2019).

Non-Pharmacological Interventions

The RN(AAP) should recommend, as appropriate, application of heat or cold to the outer ear, which may help with discomfort (Porter et al., 2019).

Pharmacological Interventions

The pharmacological interventions recommended for the treatment of OM in the pediatric client are in accordance with the *Anti-infective Guidelines for Community-acquired Infections* (Anti-infective Review Panel, 2019), *Antibiotic Therapy for Children with Acute Otitis Media* (Sakulchit & Goldman, 2017) and the *RxFiles: Drug Comparison Charts* (RxFiles Academic Detailing Program, 2021).

Treatment Principles for AOM

- All drugs must be calculated by weight until 12 years of age. Doses should not exceed recommended adult doses.
- A watchful waiting strategy is recommended for uncomplicated AOM in children older than six months of age due to high spontaneous recovery rates (Anti-infective Review Panel, 2019). Observation and analgesic treatment for previously healthy children is recommended for 48-72 hours before antibiotic therapy is initiated.
- This strategy can only be implemented when immediate follow-up by the caregiver can be guaranteed if symptoms worsen, new symptoms appear, or symptoms do not improve after two to three days. If follow-up is unlikely, consider pharmacological treatment at initial visit.
- Clients with the following signs and symptoms should be considered to have severe illness and antibiotics should be considered:
 - moderate to severe ear pain with fever $> 39^{\circ}\text{C}$,
 - bilateral AOM,
 - bulging TM,
 - systemic features,
 - vomiting, or
 - severe local signs (such as perforation with purulent discharge).
- Another option is a delayed prescribing strategy where an antibiotic prescription is to be filled if symptoms worsen or do not improve in 24 to 48 hours (Sakulchit & Goldman, 2019).
- Note that antihistamines, decongestants, intranasal or systemic corticosteroids, or topical analgesic ear drops are not effective for treating AOM or OME.

Analgesics and Antipyretics

	Drug	Dose	Route	Frequency	Duration
Pediatric					
	Acetaminophen	10-15 mg/kg (maximum daily dose of 75 mg/kg/day)	p.o.	q4-6h prn	5-7 days
AND/ OR	Ibuprofen	5-10 mg/kg (maximum daily dose of 40 mg/kg/day)	p.o.	q6-8h prn	5-7 days

Oral Antibiotics (Client without TM perforation)

Duration of antibiotic therapy for pediatric clients is 10 days for clients less than two years of age, five days for clients over the age of two years with an uncomplicated AOM, and 10 days for clients over the age of two years with AOM and a perforated TM.

High-dose amoxicillin should be considered for clients with an elevated risk of penicillin resistant *S. pneumoniae* (e.g., daycare, antibiotics exposure in past 3 months, less than 2 years of age). Second line antibiotics (e.g., amoxicillin clavulanate) should be reserved for clients who have received amoxicillin in the past 30 days, are not responding to first line treatment after 48 to 72 hours or have concurrent purulent conjunctivitis which is suggestive of *Haemophilus influenzae*.

	Drug	Dose	Route	Frequency	Duration
Pediatric (≥ 6 months) (First Line)					
	Amoxicillin	40-60 mg/kg per day (maximum daily dose of 1500 mg/day)	p.o.	t.i.d.	5-10 days
OR	Amoxicillin (High dose)	75-90 mg/kg per day (maximum daily dose of 3g/day)	p.o.	divided b.i.d.	5-10 days

Pediatric (≥ 6 months) (Second Line)					
	Drug	Dose	Route	Frequency	Duration
OR	Amoxicillin/ clavulanate 7:1	40-80 mg/kg/day (based on amoxicillin component; maximum daily dose of 3 g/day)	p.o.	divided b.i.d.	5-10 days
OR	Cefprozil	30 mg/kg/day (maximum daily dose of 1 g/day)	p.o.	divided b.i.d.	5-10 days
Pediatric (≥ 6 months) (with penicillin allergy)					
	Clarithromycin	15 mg/kg/day (maximum daily dose of 1 g/day)	p.o.	divided b.i.d.	5-10 days
OR	Azithromycin	10 mg/kg/day on day 1 and then 5 mg/kg/day on days 2- 5 (Maximum daily dose of 500 mg/day on day 1, and maximum daily dose of 250 mg/day on days 2-5)	p.o.	once daily	5 days

Topical Antibiotics (Client with TM perforation)

Topical preparations should be used with oral antibiotics only if there are signs of systemic illness where signs of infection have spread beyond the middle and external ear.

	Drug	Dose	Route	Frequency	Duration
Pediatric (≥ 6 months of age) and Adult					
	Ciprofloxacin and dexamethasone (preferred)	4 drops to affected ear	topical	b.i.d.	7 days

Client and Caregiver Education

The RN(AAP) provides client and caregiver education:

- Counsel about appropriate use of medications (dose, frequency, compliance, etc.).
- Advise on timelines of treatment and expected course of the disease process.
- Recommend increased rest in the acute pain and febrile phases.
- Avoid swimming until OM clears as water immersion could lead to otitis externa.
- Advise frequent and thorough hand washing to prevent transmission of concomitant upper respiratory illness.
- Advise to keep the ear canal clean and dry during the course of the infection.
- Recommend avoidance of air travel until symptoms have resolved.
- Avoid feeding in a supine position. Educate about the prevention of AOM directed at risk factor reduction including: breastfeeding during the first six months and longer if possible, reducing or eliminating pacifier use in the second six months of life, and avoidance of second-hand smoke exposure. Recommend immunizations if necessary (Anti-infective Review Panel, 2019; Porter et al., 2019).

Monitoring and Follow-Up

Short term monitoring and follow-up:

- For those on observation, follow-up in two to three days for reassessment of AOM.
- Follow-up in 24 hours clients who have severe symptoms and recurrence as well as young children.
- Advise caregiver of follow-up if symptoms do not improve in 48 hours or sooner if condition deteriorates (Anti-infective Review Panel, 2019; Porter et al., 2019).

Complications

The following complications may be associated with OM:

- perforated TM;
- chronic OM;
- hearing loss;
- speech, language, and cognitive disabilities;
- mastoiditis;
- meningitis (rare);
- facial nerve palsy;
- brain abscess (rare);
- [labyrinthitis](#); or
- cholesteatoma (Huether & Radway, 2019).

Referral

Refer to a physician/NP if client presentation is consistent with those identified in the *Immediate Consultation Requirements* section, or if the client's pain is not managed with simple analgesics (e.g., acetaminophen, ibuprofen) (IPAG, personal communication August 28, 2019).

References

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