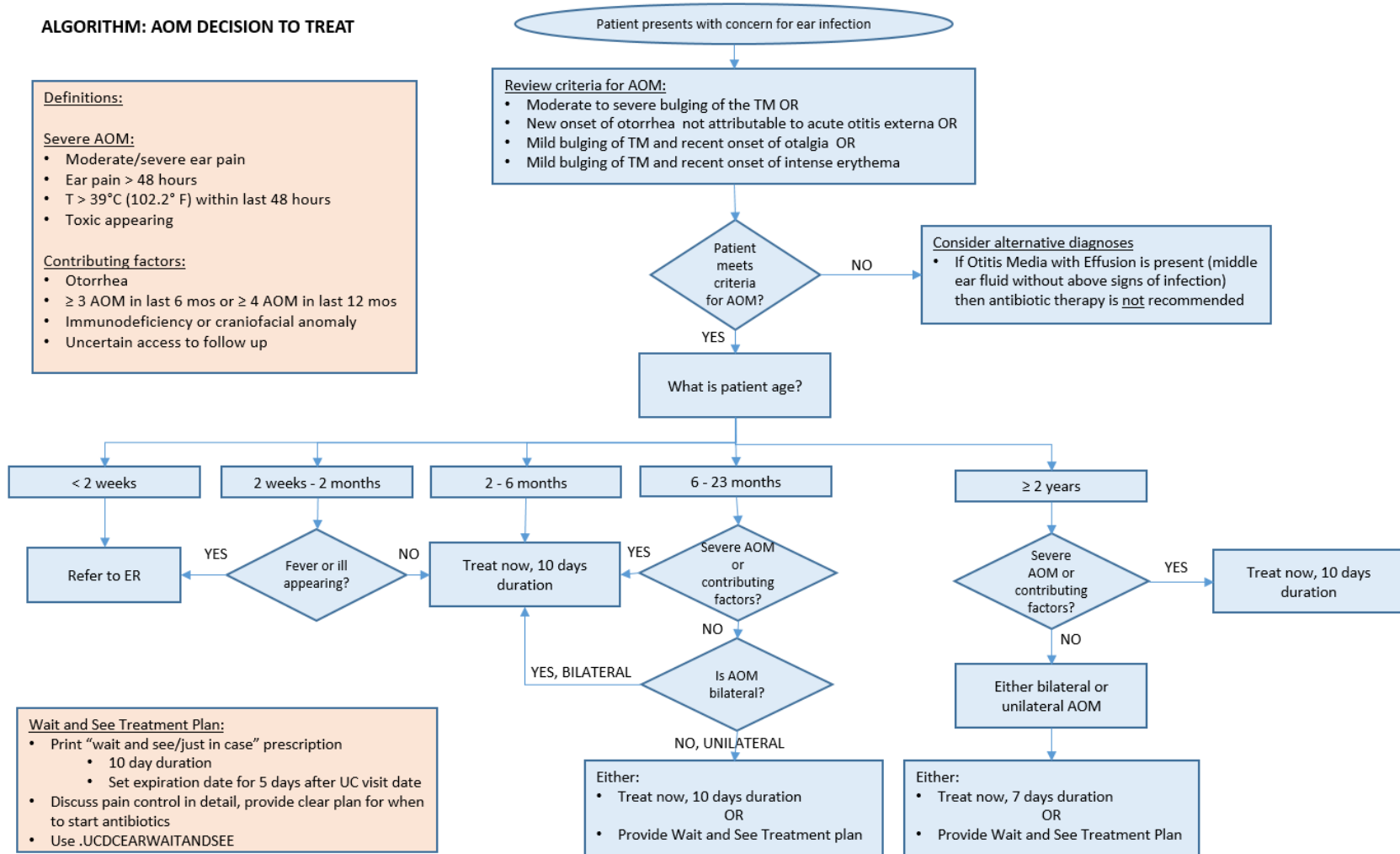


Children’s Hospital and Health System, Inc. CW Urgent Care & CMG Evidence Based Guideline: AOM

ALGORITHM: AOM DECISION TO TREAT



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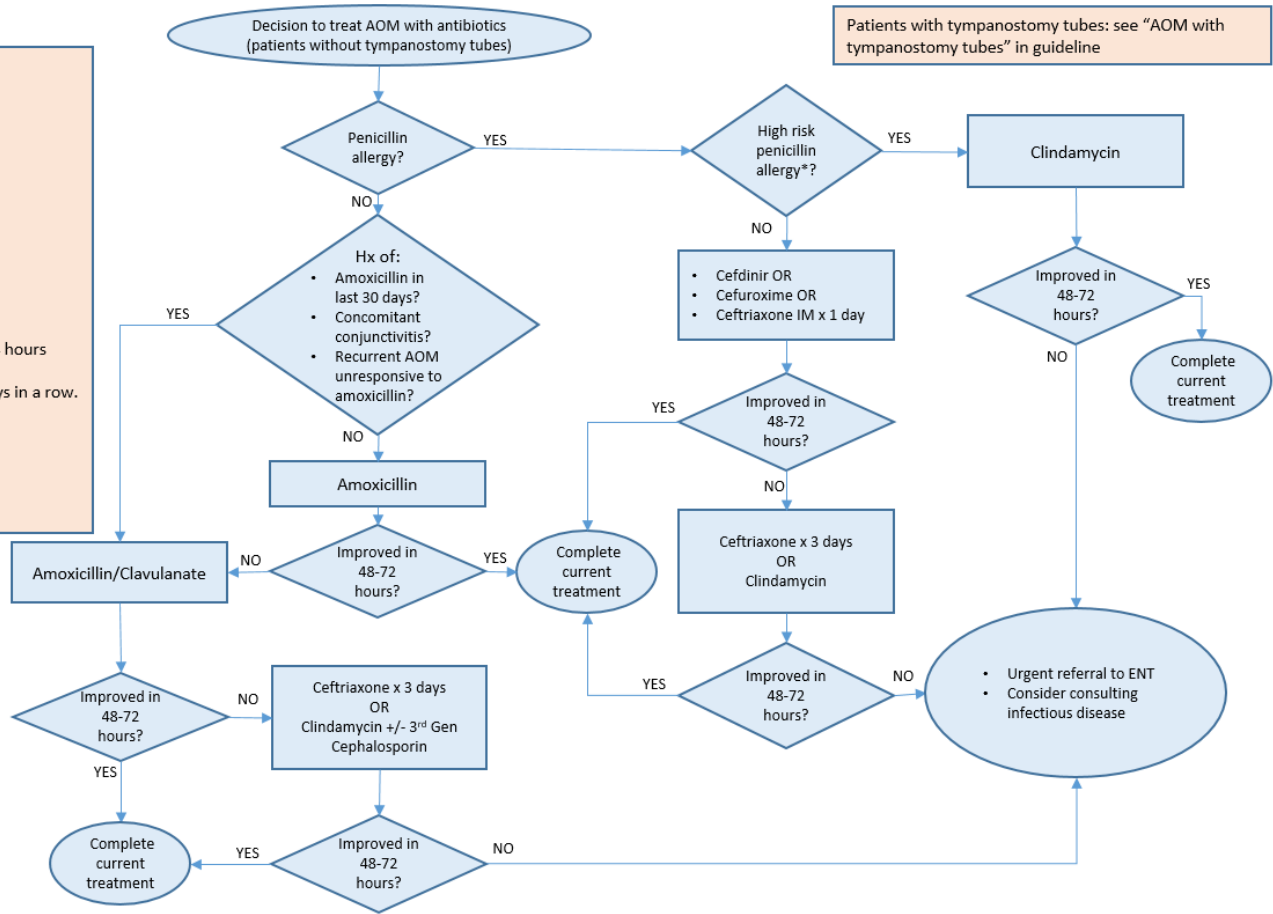
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ALGORITHM: AOM ANTIBIOTIC SELECTION

- Antibiotic Dosing Guide:**
- Amoxicillin**
- 90 mg/kg/day divided BID
 - Max DOSE 1000 mg BID
- Amoxicillin/Clavulanate**
- 90 mg/kg/day divided BID
 - Use 600 mg/5 ml suspension, max DOSE 900 mg BID
 - Use 875 mg capsule, max DOSE 875 mg BID
- Cefdinir**
- 14 mg/kg/day divided BID
 - Max DOSE 300 mg BID
- Ceftriaxone**
- 50 mg/kg/dose IM Q24 hours, max DOSE 1000 mg Q24 hours
 - First line: administer for 1 dose
 - Treatment failure: administer once Q24 hours for 3 days in a row.
- Cefuroxime**
- 30 mg/kg/day divided BID
 - Max DOSE 500 mg BID
- Clindamycin**
- 30-40 mg/kg/day divided TID
 - Max DOSE 600 mg TID

- Antibiotic Duration:**
- < 2 years: 10 days
- ≥ 2 years: **7 days for most patients**, including those with otitis / conjunctivitis, recent amoxicillin within 30 days or Hx of AOM unresponsive to amoxicillin EXCEPT treat with 10 days if:
- Severe AOM:
 - Moderate / severe ear pain
 - Ear pain > 48 hours
 - T > 39°C (102.2° F) within last 48 hrs
 - Toxic appearing
 - Contributing factors:
 - Otorrhea
 - ≥ 3 AOM in last 6 months or ≥ 4 AOM in last 12 months
 - Immunodeficiency or craniofacial anomaly
 - Uncertain access to follow up



*High risk penicillin allergy includes: anaphylaxis, mouth blisters, hypotension, seizure, peeling skin, syncope, swelling (face, lips, throat), wheezing

SUBJECT: Acute Otitis Media (AOM)

Purpose: To evaluate and initiate treatment of AOM.

Definition: Otitis media is one of the most common infectious diseases of childhood – 9% of children have at least one episode of otitis media by 3 months of age; 25% of children experience one or more episodes of otitis media by 6 months of age; 65% of children experience at least one episode of otitis media by 24 months of age. The highest age specific incidence of otitis media occurs between 6-13 months of age. One third of all children will experience ≥ 3 episodes of otitis media by age 3 years. Incidence of otitis media usually declines with age after the first year of life.

- *Acute Otitis Media* – the rapid onset of signs and symptoms of inflammation of the middle ear
- *Severe AOM*
 - Moderate/severe ear pain
 - Ear pain > 48 hours duration
 - $T > 39^{\circ}\text{C}$ (102.2°F) within last 48 hours
 - Toxic appearing
- *Otitis Media with Effusion* (OME) – inflammation of the middle ear with liquid collected in the middle ear; the signs and symptoms of acute infection are absent; frequently preceding AOM or following resolution of AOM
- *Middle Ear Effusion* (MEE) – liquid in the middle ear without reference to etiology, pathogenesis, pathology or duration
- *Eustachian Tube Dysfunction* (ETD)– failure of the functional valve of the eustachian tube to open and/or close properly
- *Otorrhea* – discharge from the ear, originating at one or more sites: external auditory canal, middle ear, mastoid
- *Otalgia* – ear pain
- *Recurrent AOM* - 3 or more well documented and separate AOM episodes in the preceding 6 months, or 4 or more episodes in the preceding 12 months with at least 1 episode in the past 6 months.

Etiology: Acute otitis media is associated with an antecedent event (i.e.: viral infection of the upper respiratory tract epithelium, allergic response) that results in congestion of the respiratory mucosa throughout the nasopharynx, eustachian tube and middle ear. Congestion of the mucosa in the eustachian tube results in obstruction of the narrowest portion of the tube, the isthmus, causing negative middle ear pressure. This encourages entry of colonized bacteria and viruses, from the nasopharynx, into the middle ear. Inflammatory changes in the middle ear mucosa leads to a middle ear effusion which may than progress to symptoms of AOM.

- Most common pathogens:
 - *Streptococcus pneumoniae*
 - Nontypeable *Haemophilus influenzae*

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- *Moraxella catarrhalis*
- Other pathogens:
 - *Group A Streptococcus*
 - *S aureus* and other bacteria – uncommon
 - *Mycoplasma pneumonia* – rare
 - *Chlamydia trachomatis* < 6 months of age
- Viral pathogens:
 - RSV (most common)
 - Influenza
 - Human metapneumovirus
- Risk factors:
 - **Most significant: viral URI while colonized with otopathogen(s)**
 - Age (younger)
 - Allergies
 - Siblings in the home
 - Craniofacial abnormalities
 - Exposure to environmental smoke or other respiratory irritants
 - Exposure to group day care
 - Family history of recurrent AOM
 - Gastroesophageal reflux
 - Immunodeficiency
 - No breastfeeding
 - Pacifier use/bottle fed

Differential Diagnosis

- Referred pain from URI, tonsillitis, teething, pharyngitis, TMJ
- Foreign body in external auditory canal
- Otitis externa
- Ear/head trauma
- Hearing loss
- Viral illness
- Otitis Media with Effusion (OME)
 - Tympanic Membrane (TM) retracted, known as ETD
 - TM may appear normal or thickened
 - Fluid level/bubbles may be seen
 - Effusion appearance may range from clear to yellow
- Red TM
 - Crying, high fever, URI with congestion and inflammation, trauma, cerumen removal
- Decreased or absent mobility of TM
 - Tympanosclerosis or high negative pressure
 - Tympanic membrane perforation

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- Middle ear effusion
- Otolgia
 - Otitis externa, ear trauma, throat infections, foreign body, teething, or TMJ syndrome
- *Newborn – may be an isolated infection or may be associated with sepsis, pneumonia or meningitis*

GUIDELINE

Subjective Data / History

- Symptoms
 - Ear pain (onset, duration)
 - Ear drainage
 - Hearing loss
 - Fever
 - Headache
 - Other upper respiratory symptoms: Congestion, rhinorrhea, sore throat, eye drainage, etc.
 - GI symptoms
 - Infants: Poor feeding, vomiting and diarrhea, sleep disturbance

Objective Data / Physical Exam

Accurate diagnosis requires systemic evaluation of TM for position, translucency, mobility, color and other findings (i.e. fluid level, perforation)

Position	<ul style="list-style-type: none">● Neutral - Normal● Retracted - Negative pressure (i.e. may be associated with OME)● Full or Bulging – Infected middle ear fluid● Precludes necessity of pneumatic otoscopy because if bulging then no mobility
Translucency	<ul style="list-style-type: none">● Translucent – Normal● Opaque or cloudy – AOM or OME● Translucent above, opaque below (i.e. air-fluid levels) – OME
Mobility / Pneumatic Assessment	<ul style="list-style-type: none">● Gold standard for diagnosing OME● Important for determining presence of middle ear effusion● Does NOT indicate whether fluid is infected● Cannot be used in isolation to make diagnosis of AOM● Pneumatic otoscopy can be very painful with AOM● Limitations in pediatrics<ul style="list-style-type: none">● Uncooperative child● Cerumen impaction● Inadequate instrumentation● Lack of expertise (i.e. must have adequate seal to be accurate)

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Color	<ul style="list-style-type: none">• Pearly gray or pink – Normal• Normal or thickened– Uninfected middle ear fluid (OME)• Amber – can be indicative of a longer lasting middle ear effusion (MEE)• White or pale yellow – Indicative of pus in the middle ear (AOM)• Asymptomatic whitish plaques – Tympanosclerosis/myringosclerosis (scars from previous injury or inflammation)• Red or Hemorrhagic-appearing TM – Acute inflammation<ul style="list-style-type: none">○ Red TM alone is not diagnostic of an AOM as this may be secondary to crying, fever, or other non-infectious cause
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- Other findings:
 - Bubbles or fluid level – OME
 - Acute perforation with purulent otorrhea – AOM (provided that acute otitis externa is excluded)
 - Bullae – AOM (caused by inflammation of TM in association with AOM)
 - Tympanosclerosis – Result of chronic inflammation, perforation, myringotomy with or without tympanostomy tube placement, frequent AOM or trauma
 - Atrophic areas – Sequelae of AOM or its treatment
 - Retraction pockets – Sequelae of AOM or chronic ETD, may predispose to development of cholesteatoma (growth of desquamated, stratified, squamous epithelium)
 - Light reflex – presence nor absence is a helpful sign in distinguishing AOM from OME, can be used when present for change during assessment for mobility

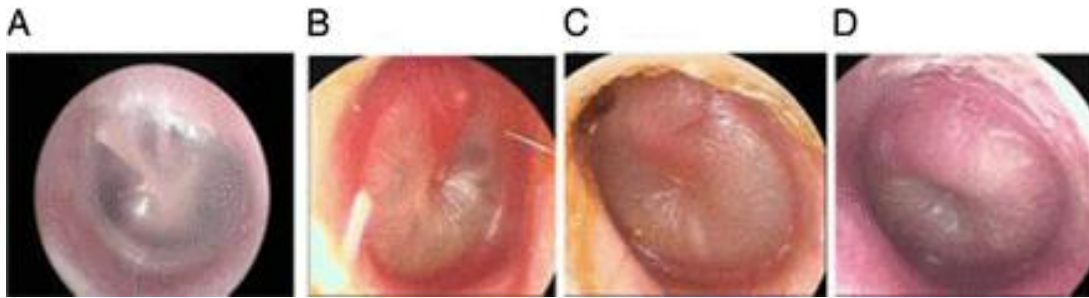
DIAGNOSIS

- Clinical diagnosis of AOM requires:
 1. Moderate to severe bulging of the TM **OR**
 2. New onset of otorrhea not attributable to acute otitis externa **OR**
 3. Mild bulging of TM **AND** recent onset of otalgia or intense erythema
- **Key considerations:**
 - Hallmark Signs of AOM - Bulging TM and Purulent Effusion
 - OME alone NOT SUFFICIENT for diagnosis of AOM
 - NOTE – Early AOM may present without bulging TM (i.e. presence of purulent effusion), but unusual to have a bulging TM without AOM

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(A) Normal TM (B) TM with mild bulging (C) TM with moderate bulging
(D) TM with severe bulging (Adapted from Lieberthal, et. al., 2013)

Diagnostic Studies: *The diagnosis is based on the history and physical. Routine labs and x-rays are not indicated.*

TREATMENT (See Algorithms)

Decision depends on age, severity of illness and parental preference.

- Transfer to CHW EDTC:
 - < 2 weeks
 - 2 weeks – 2 months if associated with fever and/or ill-appearing
 - Treatment (amoxicillin) appropriate if otherwise well and afebrile, very close follow-up by PMD (confirmed this is an appropriate recommendation with ENT)
- Symptomatic Treatment
 - **RECOMMEND** – Ibuprofen **or** Acetaminophen (equally effective) for pain control
 - **NOT RECOMMENDED** – Decongestants or antihistamines (studies lack benefit and potential for delayed resolution of middle ear fluid)
 - **NOT RECOMMENDED** – Other therapies (i.e. heat/cold application, instillation of olive oil or herbal extracts into external auditory canal)

Antibiotic Therapy

First-line therapy AOM

Consider recent AOM episodes and/or recent antibiotic use when deciding between Amoxicillin vs. Augmentin for first-line therapy

A 7 day course of treatment is appropriate for children ≥ 2 years of age with non-severe AOM who do not have additional risk factors for recurrent/refractory AOM.

Patients ≥ 2 years of age who should receive a 10 day course of therapy include:

- *Patients with Severe AOM*
 - *Moderate / severe ear pain*

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- Ear Pain > 48 hrs
- $T > 39^{\circ} C (102.2^{\circ})$ within the last 48 hrs
- Toxic appearing
- Or if:
 - Otorrhea
 - ≥ 3 AOM in last 6 mos or ≥ 4 AOM in last 12 mos
 - Immunodeficiency or craniofacial anomaly
 - Uncertain access to follow up
- Amoxicillin 80-90 mg/kg/day BID (max 1000 mg/dose)
 - If NO recent (previous 30 days) beta-lactam therapy
 - If NO concomitant purulent conjunctivitis
 - If NO history of recurrent AOM unresponsive to amoxicillin
- Augmentin ES-600 (Amoxicillin/Clavulanate) 90 mg/kg/day of amoxicillin BID (max 900 mg/dose if using Augmentin ES-600 suspension (600 mg/5 ml) or max 875 mg/dose if using 875mg Augmentin capsules)
 - If Augmentin is used for failure to improve on amoxicillin in 48-72 hours, treat for 10 full days, as patient would not meet criteria for 7 day duration of therapy.
 - If recent (previous 30 days) beta-lactam therapy then treat with Augmentin.
 - If Augmentin is utilized due to recent (previous 30 days) beta lactam therapy and patient would otherwise qualify for 7 day duration of therapy, it is appropriate to utilize a 7 day duration for Augmentin.
 - If concomitant purulent conjunctivitis.
 - If patient is otherwise appropriate for 7 days of therapy, presence of conjunctivitis does not change treatment duration recommendation.
 - Treat with Augmentin if history of recurrent AOM unresponsive to amoxicillin

Penicillin Allergy

- Cefdinir (Omnicef) 14 mg/kg/day TWICE daily (max 600 mg/day) *CW Antibiotic Stewardship recommends BID dosing*
- Cefuroxime (Ceftin) 30 mg/kg/day BID (max 1 gram/day)
- Ceftriaxone (Rocephin) IM 50 mg/kg (max 1 gram/day)
 - If Ceftriaxone is used as a first line treatment for AOM (for example, a patient unable to take PO antibiotics with newly diagnosed AOM), recommend a single dose in Urgent Care for uncomplicated patients.
 - No follow-up is needed, but counsel family that patient should be reassessed if not improved in 48-72 hours. If additional treatment with IM Ceftriaxone is needed at the time of reassessment, recommend 3 additional doses of IM Ceftriaxone Q 24 hour (see “Alternative therapy for treatment failure after 48-72 hours”)

Penicillin AND Cephalosporin Allergy

- Clindamycin 30-40 mg/kg/day TID (max 600 mg/dose)
- Sulfamethoxazole-Trimethoprim NOT RECOMMENDED due to increased resistance
 - Per CW ENT: Rarely recommend the use of Bactrim, unless very limited in antibiotic choice secondary to allergies because of evidence of resistance to *S. pneumoniae*
- Azithromycin NOT RECOMMENDED due to increased resistance

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Alternative therapy for treatment failure after 48-72 hours or refractory AOM

- Ceftriaxone (Rocephin) IM 50 mg/kg (max 1 gram / day) Q 24 hours for 3 consecutive days (3 doses)
 - AAP guideline recommends dosing for 3 consecutive days when Ceftriaxone is used for treatment failure/refractory AOM
 - If a single dose of ceftriaxone was used for initial treatment, and patient has treatment failure 48-72 hours later, then re-treat and give 3 additional consecutive days of ceftriaxone Q 24 hours (so patient receives a total of four doses in this situation)
- Clindamycin 30-40 mg/kg/day TID (max 600mg/dose), with or without 3rd generation cephalosporin

Management of patients who fail Ceftriaxone x 3 days or Clindamycin +/- 3rd generation cephalosporin

- Consult ENT on call to discuss need for urgent referral.
- Consider phone consultation with Infectious Disease

AOM with perforation (absence of tympanostomy tube)

- Oral therapy as described above
- No drops needed unless concomitant signs/symptoms of otitis externa

AOM with tympanostomy tubes

- Topical antibiotic ONLY: Quinolones preferred
 - Ofloxacin (recommend using eye drops as typically less expensive and easier to find, can use ear drops, based on cost and availability) – this is the preferred drop
 - Ciprofloxacin without dexamethasone
 - Ciprofloxacin with dexamethasone only if granulation is present
 - Dosing: BID for 7-10 days
 - If persistent more than 7 days or recurrent otorrhea, refer to ENT clinic
- May consider oral treatment in addition to otic drops if
 - Symptoms persist despite topical treatment
 - Obstruction of external canal
 - Uncooperative child
 - Concern for more severe disease
 - Cellulitis
 - Fever
 - Severe otalgia
 - Concurrent sinusitis or pharyngitis
 - Immune compromise

Observation Therapy

- Appropriate for patients \geq 6 months age with *unilateral* AOM.
- Appropriate for patients \geq 2 years with *unilateral or bilateral* AOM
- Contraindications to observation therapy include:
 - Severe AOM:

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- Moderate/severe ear pain
- Ear pain > 48 hrs
- T > 39°C (102.2°F) within last 48 hrs
- Toxic appearing
- Or if:
 - Otorrhea
 - ≥ 3 AOM in last 6 mos or ≥ 4 AOM in last 12 mos
 - Immunodeficiency or craniofacial anomaly
 - Uncertain access to follow up
- Counsel patients and families: only 1/3 of patients will need antibiotics, avoiding unnecessary antibiotics will benefit child: avoid side effects of antibiotics (nausea, diarrhea) and risk of developing antibiotic allergy.
- Make a treatment plan: discuss pain control in detail, consider scheduled ibuprofen **or** acetaminophen for the first 24-48 hours.
- Print “wait and see/just in case” prescription
 - 10 day duration
 - Set expiration date for 5 days after urgent care visit date
- Provide clear plan for when to start antibiotics
- Review symptoms that need to be seen ASAP (dehydration, breathing problems)
- Use .UCDCEARWAITANDSEE AVS

Education of Patient / Family

- About 80% of healthy children will improve within 3 days without antibiotic therapy. With antibiotic treatment, 92% will improve, but 10% will develop rash and 10% diarrhea
- Otolgia (most common complaint) can persist for up to 7 days despite antibiotic therapy
- Fever occurs in up to 2/3 of AOM episodes, although T MAX > 104 unusual
- Up to date immunization of PCV13 and annual seasonal flu immunization have shown to decrease risk of AOM

Follow Up

- Children with persistent, significant AOM symptoms after 48-72 hours of antibiotic therapy should be re-evaluated for potential change to second-line agent
- Children with OME should follow up with PMD in one month, sooner if concerns or recurrent AOM symptoms
 - Prolonged OME can lead to transient hearing loss potentially associated with language delay and chronic anatomic injury to the TM requiring reconstructive surgery
- CHW ENT referral considerations
 - 3 episodes of AOM in 6 months plus abnormal ear exam
 - 4 episodes of AOM in 1 year plus abnormal ear exam
 - Middle ear effusion for ≥ 3 months

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