Antibiotic Decision Making

Potential Barriers and Suggested Ideas for Change

Condition: Acute Otitis Media

Rationale: Antibiotic misuse/overuse is a well-documented risk factor for infection or colonization with resistant pathogens. Despite this acknowledgment, unnecessary antibiotic prescribing remains a concern in pediatric care. The AAP recommends that providers be familiar with current guidelines and recommendations for the diagnosis and treatment of common pediatric infections such as acute otitis media (AOM), including appropriate and judicious antibiotic prescribing, observation (watchful waiting) as appropriate, close follow-up, and shared-decision making with the patient/family. It is recommended that pain assessment and relief for otalgia is offered whether or not antibiotics are prescribed.

Potential Barriers	Suggested Ideas for Change	Still Not Seeing Results?
Gap: Pain treatment not assessed and offered for otalgia		
Practitioners are unaware that pain should be assessed for otalgia, and pain relief offered if moderate or severe, whether or not antibiotics are prescribed.	• Review the guideline that supports this recommendation: AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media. See the topic, Treatment of Otalgia. • Add pain assessment to the sick-visit flow for patients with suspected AOM. Use or modify the Antibiotic Decision Making for Acute Otitis Media flowchart to fit the needs of your practice and train appropriate staff in its use.	• Review the key clinical activity (KCA), **Treat Infection Effectively**, for more information on this topic.
Gap: Diagnosis for AOM not made using recommended evidence-based criteria		
There is a of lack of knowledge of the diagnostic criteria for AOM, which includes signs, symptoms, and severity.	• Review the guideline, article, and tool that outlines the diagnostic criteria to accurately diagnose AOM: ✓ AAP Guideline for AOM, described above ✓ Improving Adherence to Otitis Media Guidelines with Clinical Decision Support and Physician Feedback ✓ Antibiotic Decision Making for Acute Otitis Media flowchart	• Review the KCA, **Diagnose Infection Accurately**, for more information on this topic. • Conduct a Lunch-and-Learn with fellow clinicians to review the criteria to diagnose AOM.
Practitioners and/or staff may not recognize the importance of using strict criteria to diagnose AOM and/or the importance of avoiding the misuse of antibiotics.	• Review these guidelines, articles, and recommendations that support this importance: ✓ AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media ✓ CDC Antibiotic Resistance Threats in the United States, 2019 ✓ CDC Program: *Be Antibiotics Aware*	• Meet with staff to review these key facts and brainstorm ways to improve adherence to strict diagnostic criteria: ✓ Inappropriate diagnosis may lead to inappropriate use of antibiotics. ✓ Antibiotic overuse is a serious health threat.

Potential Barriers	Suggested Ideas for Change	Still Not Seeing Results?
		✓ Adverse effects can result from unnecessary antibiotics. ✓ Accurate diagnoses lead to appropriate treatment and judicious antibiotic use.
The practice does not have a systematic approach for applying known diagnostic criteria. ✓ Lack of a clear tool for diagnosis ✓ Lack of ready access to diagnostic information or a diagnostic tool	• Use or modify the Antibiotic Decision Making for Acute Otitis Media flowchart to fit the needs of your practice and train appropriate staff in its use. • Alternately, create your own diagnosis tool for AOM. The tool should have clear criteria for discerning between viral and bacterial infections, with emphasis on the detailed criteria for diagnosing AOM. • Make the diagnostic tool available in examination rooms. • Develop a policy for your practice regarding the judicious use of antibiotics.	• Survey the practitioners to ensure that every clinician has access to strict diagnostic criteria and a diagnostic tool for AOM. • Conduct a Lunch-and-Learn or similar session with fellow clinicians to review: ✓ Antibiotic Decision Making for Acute Otitis Media flowchart ✓ Improving Adherence to Otitis Media Guidelines With Clinical Decision Support and Physician Feedback
Practitioners have difficulty visualizing the tympanic membrane (TM) of a child in order to accurately diagnose AOM.	• Review appropriate techniques to: ✓ Ensure adequate visualization of the tympanic membrane (TM), which may require cerumen removal. ✓ Perform TM air insufflation to assess mobility. • Make images of tympanic membrane (TM) available in every examination room. Consult the AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media for more information. Figure 2 presents images displaying differing degrees of TM bulging.	• Identify a clinician who can demonstrate best practice for viewing TM and cleaning cerumen out. Set up times for observation or hold a clinic workshop with demonstration and practice. • Meet with practice staff to discuss and allocate staffing necessary to have exam assistance available when needed.
Practice does not have an effective triage system to optimize an accurate diagnosis.	• Develop and communicate practice policies to ensure a triage system is established and used appropriately. Consider the following policies: ✓ Diagnoses must be based on a physical examination by a clinician. ✓ Do not use nurse-only visits for diagnosis or treatment. ✓ Do not allow prescribing over the phone. ✓ Do not depend on parental reports based on the use of a drugstore otoscope.	• Brainstorm with practice staff for ideas to improve your triage system in order to reduce diagnoses without a physical exam by a clinician. • Establish a practice policy that eliminates nurse-only visits and over-the-phone prescribing.

Potential Barriers	Suggested Ideas for Change	Still Not Seeing Results?
Gap: Assessment for observation (ie, watchful waiting) not made		
The initial observation (watchful waiting) option is not presented because it is not understood as a treatment option for selected cases of AOM.	• Review the guidelines and recommendations that outline the options for initial observation (watchful waiting) when determining the treatment for AOM: ✓ AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media Pay attention to Table 4: Recommendations for Initial Management for Uncomplicated AOM where additional observation is an option. ✓ Nonsevere acute otitis media: a clinical trial comparing outcomes of watchful waiting vs immediate antibiotic treatment, *Pediatrics*. 2005 Jun;115(6):1455-65. • Make the option of initial observation (watchful waiting) part of your treatment flowchart for AOM as indicated by the guideline. • Use CDC's *Be Antibiotics Aware*: Delayed Prescribing and Watchful Waiting Prescription Pads	• Review the KCA, **Treat Infection Effectively**, for more information on this topic. • Meet with practitioners to review the guidance relative to offering initial observation and discuss any concerns about offering observation to patients.
Gap: 48–72 hours follow-up plan not established and documented for patients who are under observation (watchful waiting)		
There is no set protocol (including chart documentation) for follow-up when watchful waiting is chosen, or such follow-up is not documented.	• Create a clear practice protocol for following up on patients for whom a watchful waiting plan has been determined. Consider the following in the protocol: ✓ Routine discussion and selection of a follow-up plan at the patient visit when observation is selected and there is no improvement within 48–72 hours ✓ Selection of any preferred mean(s) of follow-up—appointment, phone call, e-mail, wait-and-see or safety-net prescription, etc.—for the practice ✓ Parent guidance stressing the importance of follow-up if there is no improvement (See Antibiotic Guidance and Education Checklist.) ✓ Patient charting to include documentation of follow-up plan and family discussions • Consider having staff follow up within 72 hours if the patient/family does not. Also consider adding a prompt to the EMR for follow up patients under observation. • Ask the patient/family about their preferred method for follow-up (visit, phone call, e-mail, wait-and-see, or safety-net prescription). Make it part of the visit flow to document in the medical record.	• Review the KCA, **Treat Infection Effectively**, for more information on this topic. • Discuss with staff the importance of establishing and documenting a follow-up plan when watchful waiting is determined. • Get agreement on a protocol to achieve follow-up. Identify any issues and adjust the protocol. • Develop a patient education campaign stressing the importance of following up when their child's symptoms do not improve. • Publicize the need for follow-up on your practice Web site. • Create a watchful waiting prescription-like pad that indicates

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	• Review the article, Sun D, McCarthy TJ, Liberman D. Cost-effectiveness of watchful waiting in acute otitis media. *Pediatrics.* 2017;139(4):e20163086	when and how to follow up or utilize wait-and-see or safety-net prescriptions.
Gap: Risks of antibiotic therapy not discussed with patient/family		
Practitioners may not have complete knowledge of the benefits, risks, and adverse events associated with antibiotic use, including allergy.	• As described in the following literature, in addition to explaining the benefits of antibiotic therapy, side effects and allergic reaction should be presented. Antibiotic resistance should be discussed if the patient/family has concerns: ✓ CDC Antibiotic Resistance Threats in the United States, 2019 ✓ A Review of Evidence Supporting the American Academy of Pediatrics Recommendation for Prescribing Cephalosporin Antibiotics for Penicillin-Allergic Patients ✓ Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults and Children: 2017 Update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) ✓ *AAP News* article, Why's and how's of judicious antibiotic prescribing for URIs ✓ The adverse drug events section from the Pediatric Infectious Disease Society (PIDS) Adverse Drug Reactions (ASP) Toolkit	• Review the KCA content, **Provide Guidance and Education**, and the discussion about possible drug-related adverse events for more information. • Ensure that your practice policy includes that practitioners understand therapy risks, discuss these risks with the patient/family, and document the discussion in the patient's record.
Resources are not available (or not utilized) to guide patient/family discussion of the risks related to antibiotics.	• Make selected resources readily available in examination rooms such as the following: ✓ Patient and Family Antibiotic Information Resource List, created for this course ✓ HealthyChildren.org articles, including: – Antibiotic Prescriptions for Children: 10 Common Questions Answered – How Do Antibiotics Work? – Guidelines for Antibiotic Use ✓ AAP Patient Education Online (requires subscription): – Antibiotics—When Do They Help? – Create and post a Commitment Letter in the practice waiting and/or examination rooms that includes photographs and signatures of practitioners along with their commitment to reduce inappropriate use of antibiotics. See the CDC's *Be Antibiotics Aware*: Posters for ideas.	• Utilize information from the HealthyChildren.org articles and this course's summary of possible drug-related adverse events to create your own patient handout or talking points regarding antibiotic use. • Create a Judicious Use portal on your practice Web site with educational resources including information on judicious use of antibiotics. • Elect an antibiotic educator to guide and educate patients and families on antibiotics.

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Routine education on antibiotic use and risks are not part of the practice's standard visit flow. Or, there is not enough time in the visit to adequately counsel patients and families regarding antibiotic risks and adverse effects.	• Consider making discussion and/or brochure about antibiotic use and risks a routine part of sick visits for respiratory conditions. • Consider making antibiotic education a routine part of designated well-child visits as part of well-childcare. • Provide a handout to parents during the visit that includes a list of information sources. See this course's Patient and Family Antibiotic Information Resource List. • Post antibiotic use information and policies in waiting rooms and on practice Web site, patient portal, etc. • Create and post a Commitment Letter in the practice waiting and/or examination rooms. A Commitment Letter is a poster-size letter to display in the practice's office, which should have photographs and signatures of each provider along with their commitment to reduce inappropriate use of antibiotics. • See CDC's Antibiotic Use in Outpatient Settings: Materials and References, available in several languages. • Reserve spots for same-day sick appointments in your schedule. • Inform patients/families about general infection prevention techniques. • Share articles with patients/families on ear infection prevention such as Ear Infection Information from Healthychildren.org.	• Enlist the antibiotic educator to evaluate/improve patient/family education with input from members of the practice. • Utilize information from the HealthyChildren.org articles and this course's possible drug-related adverse events to create your own patient handout or talking points regarding antibiotic use and risks. • Create a Judicious Use portal on your practice Web site with educational resources including information on your practice's approach to common clinical infections.
Educational discussions about antibiotic therapy take place but are not documented.	• Make it part of the visit flow to discuss the benefits, risks, and possible adverse effects of antibiotic therapy and to document such discussions in patient records. Recall the adage, *if it's not documented, it may not have happened.*	• Include a check box on the sick-visit flow for review of treatment benefits/risks.
Educational discussions do not include informing the patient/family of effective treatment options and judicious use of antibiotics.	• Consider the following information in educational discussions with the patient/family: ✓ Option for watchful waiting when appropriate ✓ Recommended antibiotic treatment (if any) and why that treatment is optimal ✓ Antibiotic dose ✓ The need to complete the entire course of antibiotics ✓ Benefit of treating otalgia and the analgesics available to treat otalgia ✓ Options for symptom (pain) relief ✓ When it is important to follow up (signs, symptoms, lack of improvement) ✓ Expected course of illness (See Illness Duration Table)	• Share literature with families stressing the need for adherence such as Guidelines for Antibiotic Use from Healthychildren.org.

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	• Consult the Antibiotic Guidance and Education Checklist created for this course for a summary of key points to review with patients and families. • Post judicious antibiotic use information and policies in waiting rooms and on practice Web site, patient portal, etc.	
The practice does not have adequate resources to educate parents about effective treatment of AOM and the judicious use of antibiotics.	• Select and utilize resources to educate patents/families: ✓ AAP Patient Education Online (requires subscription): – Antibiotics—When Do They Help? – Common Childhood Infections – Ear Infections – Acute Ear Infections – Middle Ear Fluid and Your Child ✓ HealthyChildren.org articles: – Antibiotic Prescriptions for Children: 10 Common Questions Answered – How Do Antibiotics Work? – Guidelines for Antibiotic Use – Caring for Your Child's Cold or Flu – Ear Infection Information – The Difference Between Sinusitis and a Cold ✓ Centers for Disease Prevention (CDC) Antibiotic Prescribing and Use in Doctor's Offices: About Antibiotic Use • Distribute Patient and Family Antibiotic Information Resource List created for this course. Make selected resources readily available in examination rooms and on practice Web site, patient portal, etc.	• Use a staff meeting to brainstorm educational needs of your patient population and ways to address them. • Develop answers to parents' common questions, beliefs, misconceptions, and resistance for use by staff. • Create a Judicious Use portal on your practice Web site with educational resources, including information on your practice's approach to common clinical infections. • Provide scripts to address symptomatic care for viral URI such as the Prescription Pads available in the CDC's Educational Materials for Healthcare Professionals. • Enlist the antibiotic educator to evaluate and update patient/family antibiotic resources.
Patient/family requests that antibiotics or a specific antibiotic should be prescribed.	• Agree on, establish, and communicate a practice policy regarding prescription of recommended antibiotic only, based on AOM clinical guidelines. • Prepare to respond to parents' requests and inquiries with an explanation of the benefits of the recommended antibiotic treatment. • Make part of the visit flow to share with patient/family which antibiotic is recommended for treatment and why it is recommended. • Establish practice policies that eliminate over-the-phone prescribing of antibiotics (ie diagnosis, must be based on a physical examination).	• Meet with staff to: ✓ Discuss the importance of a practice policy for addressing parental pressure and the best way to communicate the practice's policy. ✓ Review the online Antibiotics Tutorial available from the University of Washington interactive Medical Training

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	• Consult the Antibiotic Guidance and Education Checklist created for this course and make available patient/family resources (previously described) to educate parents about appropriate and judicious use of antibiotics.	Resources (iMTR) at https://www.uwimtr.org/dart/. ✓ Brainstorm ideas for your specific patient population to address the common concerns and misconceptions practitioners face, and develop answers to parents' common questions, beliefs, and resistance.
Gap: Inappropriate or unnecessary antibiotic prescribed		
Lack of awareness of, or access to, the clinical guideline recommendations for the correct treatment of AOM including: • First-line treatment • Treatment if recently treated, history of recurrent AOM unresponsive to amoxicillin, or concurrent purulent conjunctivitis • Treatment if penicillin or amoxicillin allergy	• Review the following guidelines: ✓ AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media in particular: – Table 4: Recommendations for Initial Management for Uncomplicated AOM – Table 5: Recommended Antibiotics for (Initial or Delayed) Treatment and for Patients Who Have Failed Initial Antibiotic Treatment – Initial Antibiotic Management: Dosage and Course Table, created for this course – AAP 2021 Policy Statement Antibiotic Stewardship in Pediatrics • For information about the **microbiology of AOM**, review resources such as: ✓ AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media *Microbiology*. pp. e981–e982. • For information about the **importance of antibiotic stewardship**, review resources such as: ✓ AAP 2021 Policy Statement Antibiotic Stewardship in Pediatrics ✓ Pediatric Antibiotic Stewardship Program (ASP) Toolkit, a collaborative effort by the Pediatric Infectious Diseases Society and the AAP ✓ CDC Program, *Be Antibiotics Aware* ✓ Antimicrobial stewardship in pediatrics: how every pediatrician can be a steward. *JAMA Pediatrics*. 2013;167(9):859-866	• Review the KCA, **Treat Infection Effectively**, for more information on this topic. • Conduct an educational session within your practice to: ✓ Review treatment tool that outlines recommended treatment. ✓ Discuss the evidence-based guideline behind it. ✓ Review the consequences of inappropriate antibiotics using the resources listed in this row. ✓ Brainstorm ways to improve antibiotic stewardship and AOM antibiotic prescribing in your practice. Test ideas for change through PDSA cycles and implement successful changes in your practice. • Review and use a diagnostic and treatment tool for AOM. Create your own or consider use of Antibiotic Decision Making for Acute Otitis Media flowchart created for this course. Also see Examining the

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	✓ Hamilton KW, Gerber JS, Moehring R, et al; Centers for Disease Control and Prevention Epicenters Program. Point-of-prescription interventions to improve antimicrobial stewardship. *Clin Infect Dis.* 2015;60(8):1252–1258. Available at: https://doi.org/10.1093/cid/civ018. Accessed June 7, 2021 • For information about **broad-spectrum vs narrow-spectrum antibiotics**, especially the role of broad-spectrum antibiotics in promoting resistance and disrupting normal flora, review: ✓ AP 2021 Policy Statement Antibiotic Stewardship in Pediatrics ✓ Association of Broad- vs Narrow-Spectrum Antibiotics With Treatment Failure, Adverse Events, and Quality Of Life in Children With Acute Respiratory Tract Infections. JAMA. 2017;318(23):2325–2336 ✓ CDC's Antibiotic Resistance Threats in the United States, 2019 ✓ The Human Microbiome and Its Potential Importance to Pediatrics • For information about the **antibiotic allergy** and the adverse effects associated with choice of antibiotic, review: ✓ Is It Really a Penicillin Allergy? ✓ Committee on Infectious Diseases: Policy statement: *Clostridium difficile* infection in infants and children ✓ *AAP News* article, Why's and how's of judicious antibiotic prescribing for URIs ✓ Blumenthal KG, Peter JG, Trubiano JA, Phillips EJ. Antibiotic allergy. *Lancet.* 2019;393(10167):183-198 ✓ List of additional antibiotic allergy resources included in this EQIPP course. • For information on symptom duration and persistence and use of watchful waiting, review: ✓ AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media ✓ Illness Duration Table created for this course ✓ Prevalence of Various Respiratory Viruses in The Middle Ear During Acute Otitis Media; *N Engl J Med.* 1999;340(4);260-264 available at: https://www.nejm.org/doi/full/10.1056/NEJM199901283400402 ✓ Thompson M, Vodicka TA, Blair PS, Buckley DI, Heneghan C, Hay AD; TARGET Programme Team. Duration of symptoms of respiratory tract	Tympanic Membrane. Make the diagnostic and treatment flowchart available in examination rooms.

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	infections in children: systematic review. *BMJ*. 2013;347:f7027. Available at: https://doi.org/10.1136/bmj.f7027. Accessed June 6, 2021 • For information on dealing with **patient/family requests for antibiotics or misconceptions** about antibiotic therapy, see the suggestions and resources for the gap, *Benefits and risks of antibiotic therapy not discussed with patient/family*. • Develop a practice-wide policy to document in the medical record the reason for prescribing alternative antibiotics (amoxicillin or amoxicillin-clavulanate are recommended). Complete and accurate medical recordkeeping helps ensure that patients get the right care at the right time and informs the ongoing treatment plan.	
Gap: Inappropriate duration of antibiotic treatment prescribed		
Lack of awareness of clinical guideline recommendations for the appropriate duration of antibiotic therapy: • 5–7 days for patients >2 years old with mild or moderate symptoms • 10 days for patients <2 years old	• Review the guidelines and recommendations provided for the gap, *Inappropriate or injudicious antibiotic prescribed,* as these resources also apply to prescribing an appropriate course of antibiotics. Pay particular attention to the duration of Therapy Section in AAP Clinical Practice Guideline: The Diagnosis and Management of Acute Otitis Media. • See the following articles available on PubMed (subscription required), which describe good outcomes using short course therapy: ✓ Five vs 10 days of antibiotic therapy for acute otitis media in young children ✓ A prospective observational study of 5-, 7-, and 10-day antibiotic treatment for acute otitis media	• Review the KCA, **Treat Infection Effectively**, for more information on this topic.

Appendix

Otaglia

In a non-verbal child, otaglia may present as holding, tugging, and rubbing of the ear. Offer analgesics (acetaminophen, ibuprofen) for pain relief treatment of otalgia.

TABLE 4

Recommendations for Initial Management for Uncomplicated AOM[1]

Age	Otorrhea With AOM[a]	Unilateral or Bilateral AOM With Severe Symptoms	Bilateral AOM-Without Otorrhea	Unilateral AOM-Without Otorrhea
6 mo to 2 yr	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy or additional observation
≥2 yr	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy or additional observation	Antibiotic therapy or additional observation

Note: Criteria for a short course (5–7 days) of antibiotics for AOM includes patients ≥2 years of age with mild or moderate AOM, ear pain <48 hours, and fever <39C (102.2F).

[1]Lieberthal AS, Carroll AE, Chonmaitree T, et al. AAP Clinical Practice Guideline: the diagnosis and management of acute otitis media. *Pediatrics*. 2013;131(3):e964-e999

TABLE 5

TABLE 5 Recommended Antibiotics for (Initial or Delayed) Treatment and for Patients Who Have Failed Initial Antibiotic Treatment

Initial Immediate or Delayed Antibiotic Treatment		Antibiotic Treatment After 48–72 h of Failure of Initial Antibiotic Treatment	
Recommended First-line Treatment	Alternative Treatment (if Penicillin Allergy)	Recommended First-line Treatment	Alternative Treatment
Amoxicillin (80–90 mg/ kg per day in 2 divided doses)	Cefdinir (14 mg/kg per day in 1 or 2 doses)	Amoxicillin-clavulanate[a] (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	Cefuroxime (30 mg/kg per day in 2 divided doses)	or	Failure of second antibiotic
Amoxicillin-clavulanate[a] (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 for 3 d)	Clindamycin (30–40 mg/kg per day in 3 divided doses) plus third-generation cephalosporin
	Ceftriaxone (50 mg IM or IV per day for 1 or 3 d)		Tympanocentesis[b]
			Consult specialist[b]

IM, intramuscular; IV, intravenous.

[a] May be considered in patients who have received amoxicillin in the previous 30 d or who have the otitis-conjunctivitis syndrome.

[b] Perform tympanocentesis/drainage if skilled in the procedure, or seek a consultation from an otolaryngologist for tympanocentesis/drainage. If the tympanocentesis reveals multidrug-resistant bacteria, seek an infectious disease specialist consultation.

Source: Lieberthal AS, Carroll AE, Chonmaitree T, et al. AAP Clinical Practice Guideline: The diagnosis and management of acute otitis media. *Pediatrics.* 2013;131(3);e964-e999

Alternative Antibiotics

Antibiotic	Important Notes
levofloxacin, linezolid, or clindamycin	Acceptable reasons for prescribing • Patient experienced previous **severe** allergic reaction. • Patient had previous severe allergy or adverse drug reaction with amoxicillin-clavulanate. • Patient had known or suspected multidrug resistant organism.
azithromycin, trimethoprim-sulfamethoxazole, cephalexin, cefixime, tetracycline, ciprofloxacin, or moxifloxacin	• These medications are considered broad-spectrum antibiotics and should not be prescribed for AOM.

Nonsevere and Severe Allergic Reactions

- **Nonsevere** symptoms include hives or pruritic (itchy) rashes.
- **Severe** symptoms include anaphylaxis, angioedema, throat tightening, wheezing plus shock, airway compromise, or cardiovascular collapse. Cardiac collapse requires intervention (eg, epinephrine, corticosteroids, vasopressors).

Note: Side effects such as vomiting, abdominal pain, and diarrhea are typically *nonallergic*.

Drug-Related Adverse Events

Possible adverse events may occur from antibiotic treatment. Some may result in additional medical visits, tests, or cost. They may even require hospitalization or be life-threatening.

Toxicity

- Toxicity can occur due to improper dosing or impaired drug metabolism.

Side Effects

- Most side effects are known and generally predictable.
- Mild side effects may include vomiting, abdominal pain, diarrhea, and nonpruritic rashes, including diaper rashes.
- Severe side effects may include *C. difficile* colitis.

Allergies/Hypersensitivity Reactions

- IgE-mediated allergies may include symptoms such as hives/urticaria, angioedema, wheezing, and anaphylaxis.
- Non–IgE-mediated hypersensitivity reactions can be severe (eg, Stevens-Johnson syndrome and toxic epidermal necrolysis).

See *Is it Really a Penicillin Allergy?* and antibiotic allergy resources included in this EQIPP course for more information about antibiotic allergies.

Antibiotic Resistance

Antibiotic resistance refers to bacteria that have become resistance to the antibiotics designed to kill them. The overuse and/or inappropriate use of antibiotics can result in the drugs' ability to treat the infection.

Infection Prevention Techniques

- Recommend pneumococcal conjugate vaccine to all children based on the schedule of the Advisory Committee on Immunization Practices of the CDC, AAP, and AAFP.
- Recommend annual influenza vaccine to all children according to schedule of the Advisory Committee on Immunization Practices of the CDC, AAP, and AAFP.
- Encourage avoidance of tobacco smoke exposure.
- Encourage hand washing.

Illness Duration Table

Average illness duration in days and time to symptom resolution in days for 50% and 90% of children with common respiratory illnesses.

Illness	Average duration of illness (days)	Symptom resolution by Day 3 (%)	Symptom resolution by Day 7 (%)
Acute otitis media	2–8 depending on self-resolution and response to therapy	50	90
Viral sore throat/tonsillitis/pharyngitis	2–7	63–66	
Streptococcal pharyngitis	3.5 without antibiotics 1–2 with antibiotics		100
Common cold**†	10–14		50 90 by 15 days

**Symptom resolution is reported at days 10 and 15 instead of day 7.
†There is much overlap with sinusitis and the persistence of symptoms or sudden worsening of symptoms raise suspicion of bacterial sinusitis.

Reference: Thompson M, Vodicka TA, Blair PS, et al. Duration of symptoms of respiratory tract infections in children: Systematic review. *BMJ.* 2013;347:f7027