# Management of Upper Respiratory Tract Infections (URTIs) in Pediatrics

**Version 1 – June 2024**

## Table of Contents

## Purpose and Scope

1.1 This guideline is an initiative of the National Antimicrobial Stewardship Committee and has been compiled by national multidisciplinary team across the UAE composed of (Pediatrics infectious disease, ENT specialty, General pediatrics, clinical pharmacy and Microbiology specialties).

1.2 This guideline was established to guide all health care professionals dealing with pediatrics age group children (0-16 years) of age to aid on clinical diagnosis, management and treatment of URTIs including (Viral URTIs, acute pharyngitis, acute otitis media, acute bacterial sinusitis, laryngotracheobronchitis (croup) and epiglottitis.

1.3 The guideline takes in consideration the international standards on the treatment of the above-mentioned diagnosis as well as the local national antibiogram reports and therefore will be subject to revisions and modifications every 3 years.

## 2. Acknowledgement:

This document was developed by; National URTI (Pediatric) guidelines Taskforce, under National Antimicrobial Resistance committee.

1. Dr. Huda Sulaiman Aldhanhani
2. Dr. Maysa Saleh
3. Dr. Aisha Abdala Alkhaaldi
4. Dr. Dr. Zulfa Omar Deesi
5. Dr. Sally Tayseer Altaher
6. Dr. Nader Francis
7. Dr. Ayesha Abdulla Al Marzooqi

**Reviewed by:**

1. Dr Nehad Al Shirawi, Chair of National ASP Committee ICU Consultant ICU, Al Fujairah Hospital, EHS.
2. Dr Walid Mohammad Abuhammour, Consultant Infectious Diseases, Al Jalila Children's Hospital

**Published by:** Ministry of Health and Prevention UAE, in electronic format only.

## 3. Policy Statement

3.1 These guidelines are intended to provide guidance for healthcare professionals working in the hospital or outpatient settings on the optimal management of children with suspected and confirmed URTI (Viral URTIs, acute pharyngitis, acute otitis media, acute bacterial sinusitis, laryngotracheobronchitis (croup) and epiglottitis).

3.2 The National Antimicrobial Stewardship Committee strongly recommends either adopting this guideline or developing/amending a facility-based guideline using this document as a reference tool.

## 4. Definitions

4.1 **Acute Bacterial Rhinosinusitis (ABS):** is an infection of the paranasal sinuses inducing persistent or severe symptoms of nasal or postnasal drainage, daytime cough, headache, facial pain, or some combination of these.

4.2 **Acute Otitis Media (AOM)**: infection of the middle ear often associated with moderate to severe bulging of the tympanic membrane or new onset of otorrhea.

4.3 **Chronic Otitis Media (COM)**: when OME persists more 3 months.

4.4 **Chronic Rhinosinusitis (CRS):** The presence of 2 or more of the following cardinal symptoms lasting for 12 weeks or longer: nasal obstruction, nasal discharge (anterior or posterior), facial pain/pressure, and cough.

4.5 **Common Cold:** is an acute, self-limited viral infection of the upper airway that may also involve the lower respiratory tract which is mostly caused by viral illness such as Respiratory syncytial virus (RSV), human metapneumovirus, parainfluenza viruses (PIVs), human coronaviruses (HCoVs), rhinoviruses, adenoviruses, influenza viruses, and enteroviruses and SARS-Cov2 etc.

4.6 **Epiglottitis:** is a life-threatening condition caused by inflammation of the epiglottis and adjacent supraglottic structures, primarily due to infection but can be due to other causes.

4.7 **Influenza:** infection is caused by one of the influenza viruses such as influenza A and B and less frequently influenza C, younger children and school aged children have higher rate of infection and may be a source of infection to adults in households.

4.8 **Laryngitis:** refers to inflammation limited to the larynx and manifests itself as hoarseness. It usually occurs in older children and adults.

4.9 **Laryngotracheitis (Croup)**: A respiratory illness characterized by inspiratory stridor, barking cough, and hoarseness.

4.10 **Laryngotracheobronchitis**: occurs when inflammation extends into the bronchi, resulting in lower airway signs.

4.11 **Otitis media with effusion (OME)**: the presence of fluid in the middle ear with accompanying conductive hearing loss and without concomitant symptoms or signs of ear infection.

4.12 **Otitis-conjunctivitis**: (also called conjunctivitis-Otitis syndrome) defined as the presence of purulent conjunctivitis in association with AOM.

4.13 **Pharyngitis:** is an inflammation of the mucous membranes and underlying structures of the throat and acute pharyngitis is defined as an infection of the pharynx and/or tonsils.

4.14 **Rhinosinusitis:** is an inflammation of the nose and paranasal sinuses.

4.15 **Subacute OME**: when OME persists from 3 weeks to 3 months after the onset of AOM.

## 5. Abbreviations

**AAP:** American Academy of Pediatrics.
**ABRS:** Acute Bacterial Rhinosinusitis.
**AMR:** Antimicrobial Resistance.
**AMR:** Antimicrobial resistance.
**AOM:** Acute Otitis Media.
**ARI:** Acute Respiratory Infection.
**ARS:** Acute Rhinosinusitis.
**CT:** Computed Tomography.
**GAS:** Group A *Streptococcus*.
**HCoV:** Human Coronavirus.
**HEV:** Human Enteroviruses.
**HIB:** *Haemophilus influenzae* type B.
**hMPV**: Human Metapneumovirus.
**HPIV:** Human Parainfluenza.
**HRV:** Human Rhinovirus.
**IDSA:** Infectious Disease Society of America.
**RADT:** Rapid Antigen Detection Test.
**UAE:** United Arab Emirates.
**URTI:** Upper Respiratory Tract Infection.
**WBC:** White blood cell.

## 6. Background

6.1 Upper respiratory tract infections (URTIs) are among the most prevalent diagnoses across all age groups especially in outpatient settings. URTIs are commonly caused by viral infections, symptoms are variable; can range from mild nasal symptoms to serious conditions like epiglottitis. In most situations, supportive symptomatic management is sufficient.

6.2 Most URTIs are viral in origin with differences in prevalence and seasonality, influenza virus often contributes to the winter peak, but Rhinovirus (HRV) present year-round with no significant seasonality. Although epidemiological features of respiratory viral infections in UAE is scarce, acute respiratory infections contributed to 13.6% in pediatric age group.

Furthermore, bacterial infections may cause acute tonsillopharyngitis in children and adolescents. Most commonly, Streptococcus pyogenes (Group A streptococcus, GAS) which accounts for approximately 15%- 30 % of all cases of pharyngitis in children.

## 7. Procedure and Responsibilities

| | Procedure | Responsibilities |
|---|---|---|
| 6.1 | **Management of Common Cold**<br><br>• As the cause is mainly viral, confirmation of the specific virus is not recommended except in case of hospitalization for "cohorting" patients and for epidemiologic studies.<br>• Common cold is a self-limiting illness. Management is mainly supportive.<br>• Anti-virals are not recommended.<br>• Antibiotics have no role. | Physician |
| 6.2 | **Management of Influenza**<br><br>• Risk factors for severe influenza in children are listed in **attachment 1.**<br>• Test for influenza during the season of influenza or if there is a clear history of exposure to a known diagnosed case with influenza.<br><br>• The gold standard test is real time PCR.<br>• Influenza rapid antigen test is simple, quick (results in < 60 minutes) and inexpensive test.<br>• Empiric treatment with antivirals indications: Start Oseltamivir within 24-48 hours of illness, don't wait for confirmatory test in the below conditions:<br>- Severe presentation.<br>- Suspected or confirmed influenza requiring hospitalization and for persons with progressive or complicated illness, regardless of previous health or vaccination status.<br>- High risk persons such as children with underlying medical condition and young children below 5 years of age | Physician |

| | | |
|---|---|---|
| | • Recommendation for Oseltamivir dose in pediatrics is listed in **attachment 2.** | |
| 6.3 | **Diagnosis of Acute Pharyngitis**<br><br>• Microbiology of acute pharyngitis is outlined in **attachment 3.**<br>• No single or combination of physical findings is specific for distinguishing GAS from viral etiologies, the IDSA has attempted to categorize some of the clinical differentiators:<br>- **Category 1** (probable viral pharyngitis) - Conjunctivitis, coryza, cough, diarrhea, viral-like exanthema.<br>- **Category 2** (suggestive of possible bacterial pharyngitis) - Fever of more than 38.5°C, tender cervical nodes, headache, petechiae of the palate, abdominal pains, or sudden onset (< 12 h).<br>• Modified Centor Score can be used to support the suspicion for GAS infection; however, it should not be used alone. (See **Attachment 4**)<br>• **Indications for testing for GAS:** Clinical decision rules, such as Centor Score, can assist in identifying patients with higher risk for GAS who warrant testing. For children with a high pre-test probability of having GAS pharyngitis (e.g., a Centor Score ≥3), microbiological diagnosis is important to limit inappropriate antibiotic use.<br>• Supportive approach is recommended in cases of viral pharyngitis.<br>• GAS is often susceptible to penicillin and according to the UAE AMR report of 2020 there was no detection of penicillin resistance GAS strains (See **attachment 13**)<br>• Antibiotic treatment of GAS pharyngitis has been shown to prevent suppurative complications and ARF, but not post-streptococcal glomerulonephritis.<br>• Recommendations for treatment of proven or highly suspected bacterial etiology for pharyngitis/tonsillitis (GAS infection) are outline in **attachment 5**.<br><br>• Recommended antibiotic treatment regimen for GAS pharyngitis is outline in **attachment 6.** | Physician |
| 6.4 | **Management of Acute Bacterial sinusitis (ABS)**<br><br>• Microbiology of acute bacterial sinusitis is outlined in **attachment 3.**<br>• ABS is purely a clinical diagnosis; criteria that can be used:<br>- **Worsening course (double sickening):** worsening or new onset of nasal discharge, daytime cough, or fever after initial improvement; OR | Physician |

| | | |
|---|---|---|
| | - **Severe onset:** concurrent fever (temperature ≥39°C) and purulent nasal discharge for at least 3 consecutive days.<br>- **Persistent illness:** nasal discharge (of any quality) or daytime cough or both lasting more than 10 days without improvement.<br>• Watchful waiting (conservative approach) is recommended for mild cases of acute rhinosinusitis with symptomatic relief: saline nasal sprays, humidifiers, and over-the-counter analgesics (e.g., acetaminophen or ibuprofen). Furthermore, if the patient meets the above criteria of ABS antibiotics treatment should be started once the diagnosis is established<br>• **Antibiotics Therapy:**<br>- Uncomplicated ABS, non-toxic appearing and can ensure follow-up in 72 hrs.: standard dose of empirical amoxicillin-clavulanate.<br>- Severe symptoms or follow up within 72 hours is not permitted: high-dose of empirical oral amoxicillin-clavulanate<br>- Second line Antibiotics: If the patient meets one of the below risk factors for *streptococcus pneumonia:* antimicrobial resistance, <u>consider 2nd line treatment options</u><br>o Age less than 2 years.<br>o Residing in an area with a high endemic rate (≥10%) of Ampicillin-resistant *H. influenzae* and Penicillin-non-susceptible *S. pneumonia.*<br>o Received antimicrobial treatment within the past month.<br>o Recent hospitalization.<br>o Daycare attendance.<br>o Un-immunization or partial immunization with pneumococcal conjugate vaccine.<br>o Immunodeficiency.<br>• Recommended duration of antibiotics: 10-14 days or 7 days after symptoms improvement.<br>• Indication for hospitalization for intravenous antimicrobials therapy:<br>- Severe ABS<br>- Complications<br>- Treatment failure with outpatient therapy after a second course of oral antimicrobials<br>• Recommended antibiotics for ABS are outlined in **attachment 7.** | |
| 6.5 | **Management of Chronic Rhinosinusitis (CRS):** | Physician |

| | | |
|---|---|---|
| | • Oral antibiotics are the mainstay of treatment of CRS in children along with control of the inflammation.<br>• **First-line:** high-dose amoxicillin or amoxicillin-clavulanic acid, Duration of treatment: 21 days<br>• **Second-line** (penicillin allergy): Cephalosporins (second or third generations) for at least 3 weeks. | |
| 6.6 | **Management of Acute Otitis Media:**<br><br>• Microbiology of acute otitis media is outlined in **attachment 3.**<br>• The choice of strategy (start antibiotics or observe) depends upon the severity of illness, the age of the child, associated conditions, and caregiver preference and reliability. (See **attachment 8**)<br>• Children at increased risk of severe infection, complications, and/or recurrent include:<br>- Infants <6 months of age.<br>- Immunocompromised.<br>- Patients who are toxic appearing.<br>- Patients with craniofacial abnormalities (eg, cleft palate).<br>• Empiric Antibiotics for AOM are listed in **attachment 9 and 10.** | Physician |
| 6.7 | **Management of Croup:**<br><br>• There are a number of validated clinical scoring systems that are used to assess croup severity. The Westley croup score has been the most extensively used to assess croup clinical severity. See **attachment 11.**<br>• Management of croup is basically supportive and no antibiotics are indicated. | Physician |
| 6.8 | **Management of Acute Epiglottitis:**<br><br>• Recommended empiric antibiotics for acute epiglottitis are outlined in **attachment 12.** | Physician |
| 6.9 | **Attachments 13** and **14** illustrates Cumulative Antimicrobial Susceptibility Pediatric Age, Antibiogram (UAE 2022). | Physician |

## 8. References

8.1 Hersh, A. L., Jackson, M. A., Hicks, L. A., ON INFECTIOUS DISEASES, T. C., Brady, M. T., Byington, C. L., Davies, H. D., Edwards, K. M., Maldonado, Y. A., Murray, D. L., Orenstein, W. A., Rathore, M., Sawyer, M., Schutze, G. E., Willoughby, R. E., & Zaoutis, T. E. (2013, December 1). Principles of Judicious Antibiotic Prescribing for Upper Respiratory Tract Infections in Pediatrics. American Academy of Pediatrics.

8.2 Pediatric Bocavirus: Background, Pathophysiology, Epidemiology. (2019, January 16). Pediatric Bocavirus: Background, Pathophysiology, Epidemiology. https://emedicine.medscape.com/article/1355393-overview#a6

8.3 UpToDate. https://www.uptodate.com/contents/group-a-streptococcal-tonsillopharyngitis-in-children-and-adolescents-clinical-features-and-diagnosis?search=bacterial%20pharyngitis&topicRef=8049&source=see_link

8.4 Shulman, S. T., Bisno, A. L., Clegg, H. W., Gerber, M. A., Kaplan, E. L., Lee, G., Martin, J. M., & Beneden, C. V. (2012, November 15). Clinical Practice Guideline for the Diagnosis and Management of Group A Streptococcal Pharyngitis: 2012 Update by the Infectious Diseases Society of America. OUP Academic.

8.5 Information For Clinicians | CDC. (2022, June 27). Pharyngitis (Strep Throat): Information for Clinicians | CDC. https://www.cdc.gov/groupastrep/diseases-hcp/strep-throat.html

8.6 Cotton, M., Innes, S., Jaspan, H., Madide, A., & Rabie, H. (n.d.). Management of upper respiratory tract infections in children. PubMed Central (PMC). https://doi.org/10.1080/20786204.2008.10873685diagnosis?search=upper%20respiratory%20infections%20in%20children&topicRef=16629&source=see_link#H1

8.7 C. S., & Litwin, C. M. (2014, June 19). The Epidemiology of Upper Respiratory Infections at a Tertiary Care Center: Prevalence, Seasonality, and Clinical Symptoms. The Epidemiology of Upper Respiratory Infections at a Tertiary Care Center: Prevalence, Seasonality, and Clinical Symptoms.

8.8 F. Simoes, E. A., Cherian, T., Chow, J., Shahid-Salles, S. A., Laxminarayan, R., & John, T. J. (2006, January 1). Acute Respiratory Infections in Children - Disease Control Priorities in Developing Countries - NCBI Bookshelf. Acute Respiratory Infections in Children - Disease a§§Control Priorities in Developing Countries - NCBI Bookshelf.

8.9 Upper Respiratory Tract Infection - PubMed. (2022, January 1). PubMed. https://pubmed.ncbi.nlm.nih.gov/30422556/

8.10 Carvajal, L. A., & Pérez, C. P. (2020, February 1). Epidemiology of Respiratory Infections. PubMed Central (PMC). https://doi.org/10.1007/978-3-030-26961-6_28

8.11 Tang, J., Chen, J., He, T., Jiang, Z., Zhou, J., Hu, B., & Yang, S. (2019, January 7). Diversity of upper respiratory tract infections and prevalence of Streptococcus pneumoniae

colonization among patients with fever and flu-like symptoms - BMC Infectious Diseases. BioMed Central.

8.12 Otitis Media: Practice Essentials, Background, Pathophysiology. (2022, April 7). Otitis Media: Practice Essentials, Background, Pathophysiology. https://emedicine.medscape.com/article/994656-overview

8.13 Jeon JH, Han M, Chang HE, Park SS, Lee JW, Ahn YJ, Hong DJ. Incidence and seasonality of respiratory viruses causing acute respiratory infections in the Northern United Arab Emirates. J Med Virol. 2019 Aug;91(8):1378-1384.

8.14 T, Bisno AL, Clegg HW, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases Society of America. Clin Infect Dis. 2012;55(10):e86. Epub 2012 Sep 9.

8.15 long sara. common cold. In: Principles and practice of pediatric infectious diseases. 6th edn. S.l.: ELSEVIER; 2022. p. 203.

8.16 long sara. influenza viruses. In: Principles and practice of pediatric infectious diseases. 6th edn. S.l.: ELSEVIER; 2022. p. 1205–1212.

8.17 N, Leonard E, Martin JM. Prevalence of Streptococcal Pharyngitis and Streptococcal Carriage in children: a meta-analysis. Pediatrics. 2010;126:e557–64. doi: 10.1542/peds.2009-2648. Epub 2010.

8.18 Bisno AL. Acute pharyngitis: etiology and diagnosis. Pediatrics. 1996;97(6 Pt 2):949.

8.19 Wald ER, Green MD, Schwartz B, Barbadora K.A streptococcal score card revisited. Pediatr Emerg Care. 1998;14(2):109.

8.20 Komaroff AL, Aronson MD, Pass TM, et al. Serologic evidence of chlamydial and mycoplasmal pharyngitis in adults. Science. 1983;222(4626):927.

8.21 Bisno AL. Acute pharyngitis: etiology and diagnosis. Pediatrics. 1996 Jun;97(6):949-54.

8.22 Gerber MA. Diagnosis and treatment of pharyngitis in children. Pediatric Clinics. 2005 Jun 1;52(3):729-47.

8.23 Nizet V, Arnold JC. Streptococcus pyogenes (Group A Streptococcus). In: Long SS, Prober CG, Fischer M, eds. Principles and Practice of Pediatric Infectious Diseases. 5th edn. Philadelphia, PA: Elsevier; 2018.

8.24 Gerber MA, Baltimore RS, Eaton CB, et al. Prevention of rheumatic fever and diagnosis and treatment of acute Streptococcal pharyngitis: A scientific statement from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee of the Council on Cardiovascular Disease in the Young, the Interdisciplinary Council on Functional Genomics and Translational Biology, and the Interdisciplinary Council on Quality of Care and Outcomes Research; endorsed by the American Academy of Pediatrics. Circulation 2009;119(11):1541-51.

8.25 Little P, Hobbs FD, Moore M, et al. Clinical score and rapid antigen detection test to guide antibiotic use for sore throats: Randomized controlled trial of PRISM (primary care streptococcal management). BMJ 2013;347:f5806.

8.26 Dingle TC, Abbott AN, Fang FC. Reflexive culture in adolescents and adults with group A streptococcal pharyngitis. Clin Infect Dis 2014;59(5):643-50.

8.27 Spurling GK, Del Mar CB, Dooley L, Foxlee R, Farley R. Delayed antibiotic prescriptions for respiratory infections. Cochrane Database Syst Rev 2017;9(9):CD004417.

8.28 Gerber MA, Shulman ST. Rapid diagnosis of pharyngitis caused by group A streptococci. Clinical microbiology reviews. 2004 Jul;17(3):571-80.

8.29 American Academy of Pediatrics. Committee on Infectious D. Group A Streptococcal Infections. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, editors. Red Book: 2018 Report of the Committee on Infectious Diseases. Elk Grove Village, IL: American Academy of Pediatrics; 2018.

8.30 Sauve L, Forrester AM, Top KA. Group A streptococcal pharyngitis: A practical guide to diagnosis and treatment. Paediatrics & Child Health. 2021 Aug;26(5):319-.

8.31 Ramadan H, Chaiban R, Makary C. Pediatric Rhinosinusitis. Pediatr Clin N Am 69 (2022) 275–286.

8.32 Leung AKC, Hon KL, Chu WCW. Acute bacterial sinusitis in children: an updated review. Drugs in Context 2020; 9: 2020-9-3.

8.33 Sur D, Plesa M L. Antibiotic Use in Acute Upper Respiratory Tract Infections. Am Fam Physician, 2022;106(6):628-636.

8.34 Richards N, Tiedeken SD, Chang CC. Medical Management of Acute Rhinosinusitis in Children and Adults. Diseases of the Sinuses, © Springer Science+Business Media New York 2014.

8.35 DeMuri GP, Wald ER. Acute Bacterial Sinusitis in Children. Engl J Med 2012; 367:1128-34.

8.36 Chow AW, Benninger MS, Brook I, et al.; Infectious Diseases Society of America. IDSA clinical practice guideline for acute bacterial rhinosinusitis in children and adults. Clin Infect Dis. 2012;54(8): e72-e112.

8.37 AMERICAN ACADEMY OF PEDIATRICS. Principles of Judicious Antibiotic Prescribing for Upper Respiratory Tract Infections in Pediatrics. PEDIATRICS Volume 132, Number 6, December 2013.

8.38 Weintraub B. Upper Respiratory Tract Infections. Pediatrics in Review 2015;36;55.

8.39 Smith RM, Zhou C, Robinson JD, Taylor JA, Elliott MN, Heritage J. Communication Practices and Antibiotic Use for Acute Respiratory Tract Infections in Children. Fam Med 2015; 13:221-227.

8.40 Falagas M, Giannopolou KP, Vardakas KZ, Dimopolos G, Karageorgopolos DE. Comparison of antibiotics with placebo for treatment of acute sinusitis: a meta-analysis of randomized controlled trials. Lancet infect dis 2008, 8: 543-52.

8.41 American Academy of Pediatrics. Nelson's Pediatric Antimicrobial Therapy 2023, 29th Edition.

8.42 H., Stover, C. S., & Litwin, C. M. (2014, June 19). The Epidemiology of Upper Respiratory Infections at a Tertiary Care Center: Prevalence, Seasonality, and Clinical Symptoms. The Epidemiology of Upper Respiratory Infections at a Tertiary Care Center: Prevalence, Seasonality, and Clinical Symptoms. https://doi.org/10.1155/2014/46939- PubMed. (2022, January 1). PubMed.

8.43 Tang, J., Chen, J., He, T., Jiang, Z., Zhou, J., Hu, B., & Yang, S. (2019, January 7). Diversity of upper respiratory tract infections and prevalence of Streptococcus pneumoniae colonization among patients with fever and flu-like symptoms - BMC Infectious Diseases. BioMed Central.

8.44 Meherali S, Campbell A, Hartling L, Scott S. Understanding Parents' Experiences and Information Needs on Pediatric Acute Otitis Media: A Qualitative Study. J Patient Exp. 2019 Mar;6(1):53-61.

8.45 Minovi A, Dazert S. Diseases of the middle ear in childhood. GMS Curr Top Otorhinolaryngol Head Neck Surg. 2014. 13:Doc11

8.46 Lieberthal AS, Carroll AE, Chonmaitree T, et al. The diagnosis and management of acute otitis media. Pediatrics. 2013;131(3):e964.

8.47 Vila PM, Ghogomu NT, Odom-John AR, et al. Infectious complications of pediatric cochlear implants are highly influenced by otitis media. Int J Pediatr Otorhinolaryngol. 2017 Jun; 97:76-82.

8.48 Berkman ND, Wallace IF, Steiner MJ, et al. Otitis Media with Effusion: Comparative Effectiveness of Treatments. Comparative Effectiveness Review No. 101. Rockville, MD: Agency for Healthcare Research and Quality; 2013. AHRQ publication 13-EHC091-EF.

8.49 Ardiç C, Yavuz E. Effect of breastfeeding on common pediatric infections: a 5-year prospective cohort study. Arch Argent Pediatr. 2018 Apr 01;116(2):126-132

8.50 Jones LL, Hassanien A, Cook DG, Britton J, Leonardi-Bee J. Parental smoking and the risk of middle ear disease in children: a systematic review and meta-analysis. Arch Pediatr Adolesc Med. 2012 Jan;166(1):18-27.

8.51 Coker TR, Chan LS, Newberry SJ, et al. Diagnosis, microbial epidemiology, and antibiotic treatment of acute otitis media in children: a systematic review. JAMA. 2010;304(19):2161.

8.52 Ubukata K, Morozumi M, Sakuma M, et al. AOM Surveillance Study Group. Etiology of Acute Otitis Media and Characterization of Pneumococcal Isolates After Introduction of 13-Valent Pneumococcal Conjugate Vaccine in Japanese Children. Pediatr Infect Dis J. 2018 Jun;37(6):598-604.

8.53 Ubukata K, Morozumi M, Sakuma M, et al. AOM Surveillance Study Group. Genetic characteristics and antibiotic resistance of Haemophilus influenzae isolates from pediatric patients with acute otitis media after introduction of 13-valent pneumococcal conjugate vaccine in Japan. J Infect Chemother. 2019 Sep;25(9):720-726

8.54 Kaur R, Morris M, Pichichero ME. Epidemiology of Acute Otitis Media in the Post pneumococcal Conjugate Vaccine Era. Pediatrics. 2017;140(3)

8.55 Ben-Shimol S, Givon-Lavi N, Leibovitz E, Raiz S, et al. Impact of Widespread Introduction of Pneumococcal Conjugate Vaccines on Pneumococcal and Nonpneumococcal Otitis Media. Clin Infect Dis. 2016;63(5):611. Epub 2016 May 25.

8.56 Klein J, Chan S. Methicillin-resistant Staphylococcus aureus in middle ear fluid of children. Clin Pediatr (Phila). 2010;49(1):66.

8.57 Hullegie S, Venekamp RP, van Dongen TMA, et al. Prevalence and Antimicrobial Resistance of Bacteria in Children with Acute Otitis Media and Ear Discharge: A Systematic Review. Pediatr Infect Dis J. 2021;40(8):756.

8.58 Ruohola A, Meurman O, Nikkari S, et al. Microbiology of acute otitis media in children with tympanostomy tubes: prevalence of bacteria and viruses. Clin Infect Dis. 2006;43(11):1417.

8.59 Stockmann C, Ampofo K, Hersh AL, et al., Seasonality of acute otitis media and the role of respiratory viral activity in children. Pediatr Infect Dis J. 2013;32(4):314.

8.60 Protasova IN, Per'yanova OV, Podgrushnaya TS. [Acute otitis media in the children: etiology and the problems of antibacterial therapy]. Vestn Otorinolaringol. 2017;82(2):84-89.

8.61 Turner D, Leibovitz E, Aran A, et al. Acute otitis media in infants younger than two months of age: microbiology, clinical presentation and therapeutic approach. Pediatr Infect Dis J. 2002;21(7):669.

8.62 Bluestone CD, Klein JO. Microbiology. In: Otitis Media in Infants and Children, 4th ed, BC Decker, Hamilton, ON 2007. p.101.

8.63 Ahn JH, Kim MN, Suk YA, Moon BJ. Preoperative, intraoperative, and postoperative results of bacterial culture from patients with chronic suppurative otitis media. Otol Neurotol. 2012 Jan;33(1):54-9.

8.64 McCormick DP, Jennings K, Ede LC, et al. Use of symptoms and risk factors to predict acute otitis media in infants. Int J Pediatr Otorhinolaryngol. 2016;81:55. Epub 2015 Dec 18.

8.65 Jones WS, Kaleida PH. How helpful is pneumatic otoscopy in improving diagnostic accuracy? Pediatrics. 2003;112(3 Pt 1):510.

8.66 Shaikh N, Hoberman A, Kaleida PH, Ploof DL, Paradise JL. Diagnosing otitis media-otoscopy and cerumen removal. New England Journal of Medicine. 2010 May 20;362(20):e62.

8.67 Pelton SI. Otoscopy for the diagnosis of otitis media. Pediatr Infect Dis J. 1998;17(6):540.

8.68 Chiappini E, Ciarcià M, Bortone B e tal. Italian Panel for the Management of Acute Otitis Media in Children. Updated Guidelines for the Management of Acute Otitis Media in Children by the Italian Society of Pediatrics: Diagnosis. Pediatr Infect Dis J. 2019 Dec;38(12S Suppl):S3-S9.

8.69 Marchisio P, Galli L, Bortone B, et al. Italian Panel for the Management of Acute Otitis Media in Children. Updated Guidelines for the Management of Acute Otitis Media in Children by the Italian Society of Pediatrics: Treatment. Pediatr Infect Dis J. 2019 Dec;38(12S Suppl): S10-S21.

8.70 Bales CB, Sobol S, Wetmore R, Elden LM. Lateral sinus thrombosis as a complication of otitis media: 10-year experience at the children's hospital of Philadelphia. Pediatrics. 2009;123(2):709.

8.71 Penido Nde O, Borin A, Iha LC, Suguri VM, Onishi E, Fukuda Y, Cruz OL. Intracranial complications of otitis media: 15 years of experience in 33 patients. Otolaryngol Head Neck Surg. 2005 Jan;132(1):37-42.

8.72 Mattos JL, Colman KL, Casselbrant ML, Chi DH. Intratemporal and intracranial complications of acute otitis media in a pediatric population. Int J Pediatr Otorhinolaryngol. 2014 Dec;78(12):2161-4.

8.73 Kimberlin DW, Barnett ED, Lynfield R, Sawyer MH (Eds), American Academy of Pediatrics, Itasca, IL 2021. p.990.Schaad UB. Predictive value of double tympanocentesis in acute otitis media. Pharmacotherapy. 2005 Dec;25(12 Pt 2):105S-10S

8.74 Rovers MM, Glasziou P, Appelman CL, et al. Hoes AW Antibiotics for acute otitis media: a meta-analysis with individual patient data. Lancet. 2006;368(9545):1429.

8.75 Venekamp RP, Sanders SL, Glasziou PP, et al. Antibiotics for acute otitis media in children. Cochrane Database Syst Rev. 2015;

8.76 American Academy of Pediatrics. Systems-based treatment table. In: Red Book: 2021-2024 Report of the Committee on Infectious Diseases, 32nd ed,

8.77 Siddiq S, Grainger J. The diagnosis and management of acute otitis media: American Academy of Pediatrics Guidelines 2013. Arch Dis Child Educ Pract Ed. 2015 Aug;100(4):193-7.

8.78 Lee GM, Kleinman K, Pelton S, et al. Immunization, Antibiotic Use, and Pneumococcal Colonization Over a 15-Year Period. Pediatrics. 2017;140(5) Epub 2017 Oct 4.

8.79 Marchica CL, Dahl JP, Raol N. What's New with Tubes, Tonsils, and Adenoids? Otolaryngol Clin North Am. 2019 Oct;52(5):779-794.Stepan IP, Paula T, Morven SE, Acute otitis media in children: Treatment, UpToDate 2023 https://www.uptodate.com/contents/acute-otitis-media-in-children-treatment

8.80 Rosenfeld RM, Shin JJ, Schwartz SR, Coggins R, Gagnon L, Hackell JM, Hoelting D, Hunter LL, Kummer AW, Payne SC, Poe DS. Clinical practice guideline: otitis media with effusion (update). Otolaryngology–Head and Neck Surgery. 2016 Feb;154: S1-41.

8.81 Stephen IP, Paula T, Morven SE, Acute otitis media in children: Treatment, up to date 2023,

8.82 Tovar Padua, LJ and Cherry JD. Croup (laryngitis, laryngotracheitis, spasmodic croup, laryngotracheobronchitis, bacterial tracheitis, and laryngotracheobronchopneumonitis) and epiglottitis (supraglottitis). In: Feigin and Cherry's Textbook of Pediatric Infectious Diseases, 8th edition, Cherry JD, Harrison GJ, Kaplan SL, Steinbach WJ, Hotez PJ (Eds), Elsevier, Philadelphia 2019. Vol 1, p.175.

8.83 AUShah RK, Roberson DW, Jones DT. Epiglottitis in the Hemophilus influenzae type B vaccine era: changing trends Laryngoscope. 2004;114(3):557.

8.84 Tanner K, Fitzsimmons G, Carrol ED, et al. Hemophilus influenzae type b epiglottitis as a cause of acute upper airways obstruction in children. BMJ. 2002;325(7372):1099.

8.85 Glomb NWS and Cruz AT. Infectious disease emergencies. In: Fleisher and Ludwig's Textbook of Pediatric Emergency Medicine, 7th ed, Shaw KN, Bachur RG (Eds), Wolters Kluwer, Philadelphia 2016.

8.86 Shah RK, Roberson DW, Jones DT. Epiglottitis in the Hemophilus influenzae type B vaccine era: changing trends. Laryngoscope. 2004;114(3):557.

8.87 Briem B, Thorvardsson O, Petersen H. Acute epiglottitis in Iceland 1983-2005. Auris Nasus Larynx. 2009;36(1):46.

8.88 Somenek M, Le M, Walner DL. Membranous laryngitis in a child. Int J Pediatr Otorhinolaryngol. 2010;74(6):704. Epub 2010 Apr 15.

8.89 Isakson M, Hugosson S. Acute epiglottitis: epidemiology and Streptococcus pneumoniae serotype distribution in adults. J Laryngol Otol. 2011;125(4):390. Epub 2010 Nov 25.

8.90 Sivakumar S, Latifi SQ. Varicella with stridor: think group A streptococcal epiglottitis. J Paediatr Child Health. 2008;44(3):149.

8.91 Beltrami D, Guilcher P, Longchamp D, et al. Meningococcal serogroup W135 epiglottitis in an adolescent patient. BMJ Case Rep. 2018;2018 Epub 2018 Mar 5.

8.92 O'Bryant SC, Lewis JD, Cruz AT, Mothner BA. Influenza A-Associated Epiglottitis and Compensatory Pursed Lip Breathing in an Infant. Pediatr Emerg Care. 2019;35(11): e213.

8.93 Grattan-Smith T, Forer M, Kilham H, Gillis J. Viral supraglottitis. J Pediatr. 1987;110(3):434.

8.94 Slijepcevic A, Strigenz D, Wiet G, Elmaraghy CA. EBV epiglottitis: Primary supraglottic viral infection in a pediatric immunocompetent host. Int J Pediatr Otorhinolaryngol. 2015;79(10):1782. Epub 2015 Aug 12.

8.95 Tebruegge M, Connell T, Kong K, et al. Necrotizing epiglottitis in an infant: an unusual first presentation of human immunodeficiency virus infection. Pediatr Infect Dis J. 2009;28(2):164.

8.96 Fondaw A, Arshad M, Batool S, et al. COVID-19 infection presenting with acute epiglottitis. J Surg Case Rep. 2020;2020(9): rjaa280. Epub 2020 Sep 8.

8.97 Cordial P, Le T, Neuenschwander J. Acute epiglottitis in a COVID-19 positive patient. Am J Emerg Med. 2022; 51:427. e1. Epub 2021 Jul 7.

8.98 Stroud RH, Friedman NR. An update on inflammatory disorders of the pediatric airway: epiglottitis, croup, and tracheitis. Am J Otolaryngol. 2001;22(4):268.

8.99 Tibballs J, Watson T. Symptoms and signs differentiating croup and epiglottitis. J Paediatr Child Health. 2011;47(3):77.

8.100 Glynn F, Fenton JE. Diagnosis and management of supraglottitis (epiglottitis). Curr Infect Dis Rep. 2008;10(3):200.

8.101 Guldfred LA, Lyhne D, Becker BC. Acute epiglottitis: epidemiology, clinical presentation, management and outcome. J Laryngol Otol. 2008;122(8):818. Epub 2007 Sep 25.

8.102 Sobol SE, Zapata S. Epiglottitis and croup. Otolaryngol Clin North Am. 2008;41(3):551.

8.103 Damm M, Eckel HE, Jungehülsing M, Roth B. Management of acute inflammatory childhood stridor. Otolaryngol Head Neck Surg. 1999;121(5):633.

8.104 Ducic Y, Hébert PC, MacLachlan L. Description and evaluation of the vallecula sign: a new radiologic sign in the diagnosis of adult epiglottitis. Ann Emerg Med. 1997;30(1):1.

8.105 Nakamura H, Tanaka H, Matsuda A, Acute epiglottitis: a review of 80 patients. J Laryngol Otol. 2001;115(1):31.

## 9. Tools and Attachments:

9.1 Attachment 1: Risk Factors for Severe Influenza in Pediatrics.

9.2 Attachment 2: Recommended Doses for Oseltamivir in Pediatrics.

9.3 Attachment 3: Microbiology of Respiratory Tract Infections in Pediatrics.

9.4 Attachment 4: Centor Criteria.

9.5 Attachment 5: Recommended Approach for Management of Suspected GAS Pharyngitis in Pediatrics.

9.6 Attachment 6: Recommended Antibiotic Regimen for GAS Pharyngitis in Pediatrics.

9.7 Attachment 7: Recommended Empiric Antibiotic Regimen for Acute Bacterial Sinusitis in Pediatrics.

9.8 Attachment 8: Management of Acute Otitis Media in Pediatrics.

9.9 Attachment 9: Empiric Antibiotics for Acute Otitis Media in Pediatrics.

9.10 Attachment 10: Management of Acute Otitis Media in Pediatrics.

9.11 Attachment 11: Westley Croup Severity Score.

9.12 Attachment 12: Empiric Antibiotic Therapy for Acute Epiglottitis in Pediatrics.

9.13 Attachment 13: Cumulative Antimicrobial Susceptibility Pediatric Age, Gram-positive Antibiogram (UAE 2022).

9.14 Attachment 14: Cumulative Antimicrobial Susceptibility Pediatric Age, Gram-negative Antibiogram (UAE 2022).

## 10. Key Performance Indicators

10.1 Appropriate selection of antibiotic for upper respiratory tract infection in paediatric (AOM).

10.2 Proper antibiotics prescription for GAS pharyngitis.

## Attachment 1: Risk Factors for Severe Influenza in Pediatrics

| |
|---|
| Children below < 5 years of age, particularly children <2 years |
| Children with underlying morbidities (Chronic asthma, cardiovascular, renal, hepatic, hematologic, neurologic, neuromuscular or metabolic |
| Immune suppression due to medications or HIV infection |
| Children receiving long term aspirin therapy |
| Morbid obesity |
| Children below < 5 years of age, particularly children <2 years |

## Attachment 2: Recommended Doses for Oseltamivir in Pediatrics

| **Agent** | weight | |
|---|---|---|
| **Oseltamivir for 5 days** | 2 weeks – 11months | 3mg/kg/dose twice a day |
| | < and = 15 kg | 30mg twice a day |
| | >15 – 23 kg | 45mg twice a day |
| | >23-40kg | 60mg twice a day |
| | >40kg | 75mg twice a day |

***Dose need to be adjusted in children with renal failure**

*Note: Oseltamivir is approved for treatment of infants ≥2 weeks of age and chemoprophylaxis for children≥ 1* year of age, inhaled zanamivir is approved for treatment of children *≥7 years and chemoprophylaxis for children ≥5 years of age*

## Attachment 3: Microbiology of Respiratory Tract Infections in Pediatrics

| Disease | Organisms |
|---|---|
| **Acute Pharyngitis** | • Viral infection is the most common etiology.<br>• Group A *Streptococcus* (GAS) accounts for almost 15 to 30 % of all cases of pharyngitis in children between the ages of 5 and 15 years. |
| **Acute Rhinosinusitis** | • Majority of cases are caused by viruses<br>• Bacterial causes include *Streptococcus pneumoniae*, *Hemophilus influenzae*, and *Moraxella catarrhalis.*<br>• *Hemophilus influenzae* appears to have become more common, with increasing rates of beta-lactamase production.<br>• According to the UAE antimicrobial resistance report of 2021, the prevalence of Penicillin- resistant *Streptococcus pneumonia* to penicillin is only 7%. |
| **Acute Otitis Media** | • Viral: respiratory syncytial virus (RSV), coronaviruses, influenza viruses, adenoviruses, human metapneumovirus, and picornaviruses.<br>• Bacterial: *Streptococcus pneumoniae*, nontypeable *Hemophilus influenzae* (NTHi), *Moraxella catarrhalis*, Group A *Streptococcus* (GAS) and uncommonly *Staphylococcus aureus.* |
| **Croup** | • Mainly viral infection, particularly parainfluenza viruses (1.2.3) influenza A, influenza B, adenovirus, respiratory syncytial virus (RSV), and metapneumovirus. |
| **Epiglottitis** | • Bacteria: *Haemophilus influenzae* type b (Hib) primarily in unvaccinated or incompletely immunized children which became less frequent after childhood immunization.<br>• Other bacterial etiologies in immunocompetent individuals: *Staphylococcus aureus* (including methicillin-resistant strains), *Streptococcus pneumoniae*, *Streptococcus pyogenes* and other *streptococci, Neisseria meningitidis,* and *Pasteurella multocida.*<br>• Pathogens that may cause epiglottis in immunocompromised hosts: *Pseudomonas aeruginosa*, *Serratia spp*, *Enterobacter spp,* and anaerobic flora.<br>• Viral infection: may rarely cause epiglottitis or enable bacterial superinfection. Viruses isolated include Influenza (A, B), Herpes simplex virus, types 1, 2, Parainfluenza virus, Epstein-Barr virus, Human immunodeficiency virus (HIV), SARS-CoV- |

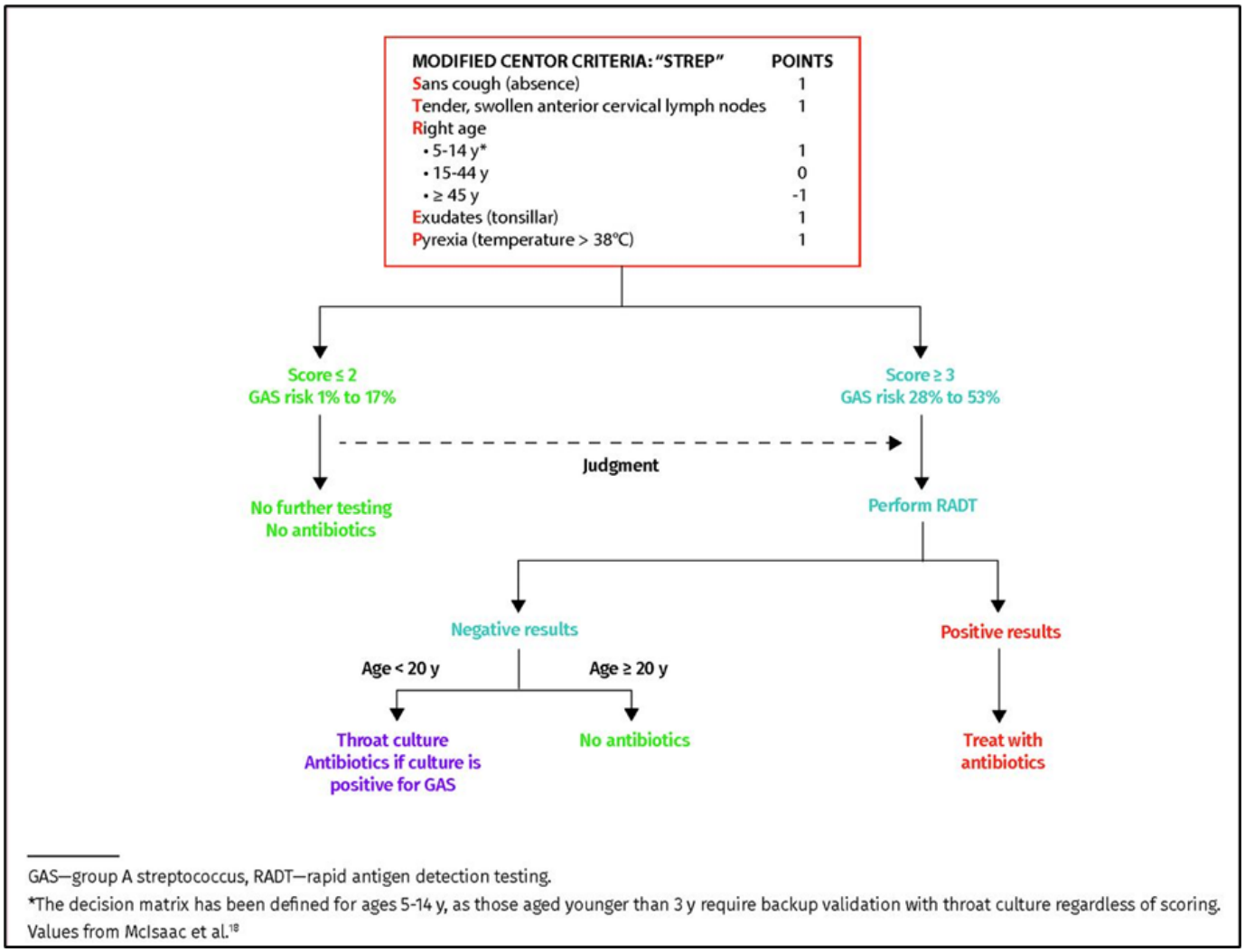
## Attachment 4: Centor Criteria

]

| **CENTOR Clinical decision rule** |
| --- |
| (**Only for children aged 3 to 14 years**) |
| One point for each characteristic:<br>• Exudate or swollen tonsils<br>• Tender or swollen anterior cervical lymph nodes<br>• Fever<br>• No cough |

*Note: Each of the Centor criteria score 1 point (maximum score of 4). A score of 0, 1 or 2 is thought to be associated with a 3 to 17% likelihood of isolating streptococcus. A score of 3 or 4 is thought to be associated with a 32 to 56% likelihood of isolating streptococcus.*

## Attachment 5: Recommended Approach for Management of Suspected GAS Pharyngitis




GAS—group A streptococcus, RADT—rapid antigen detection testing.
*The decision matrix has been defined for ages 5-14 y, as those aged younger than 3 y require backup validation with throat culture regardless of scoring.
Values from McIsaac et al.[18]

Adopted from: Canadian Family Physician April 2020, 66 (4) 251-257

## Attachment 6: Recommended Antibiotic Regimen for GAS Pharyngitis in Pediatrics

| **No history of Penicillin Allergy** | | |
|---|---|---|
| **Antibiotic** | **Dose** | **Duration** |
| Penicillin V<br>Route: oral | Children: 250 mg twice daily or 3 times daily<br>Adolescents: 500 mg twice daily | 10 days |
| Amoxicillin<br>Route: oral | 50 mg/kg once daily (max = 1000 mg/day);<br>alternative: 25 mg/kg (max = 500 mg) twice daily | 10 days |
| Benzathine penicillin G<br>Route: intramuscular<br>(*Consider IM penicillin G in children who are not able to tolerate oral antibiotics, who may fail to complete the course with difficulty to follow up)* | Weight ≤ 27 kg: 600,000 units<br>Weight ≥ 27 kg: 600,000 units | Once<br>Once |
| **History of penicillin allergy** | | |
| Cefalexin<br>Route: Oral | 20 mg/kg/dose twice daily (max = 500 mg/dose) | 10 days |
| Clindamycin<br>Route: oral | 7 mg/kg/dose 3 times daily (max = 300 mg/dose) | 10 days |
| Azithromycin<br>Route: oral | 12 mg/kg once daily (max = 500 mg) | 5 days |
| Clarithromycin<br>Route: oral | 7.5 mg/kg/dose twice daily (max = 250 mg/dose) | 10 days |

## Attachment 7: Recommended Empiric Antibiotic Regimen for Acute Bacterial Sinusitis in Pediatrics

| Antibiotic | Dose |
|---|---|
| **First line Antibiotics** | |
| Amoxicillin-Clavulanate | **Standard dose**<br>45 mg/kg/day (maximum 1.75 g/day)<br>**High dose**<br>90 mg/kg/day of the amoxicillin component, divided into two doses; maximum 4 g/day) |
| **Second line: Possible Antimicrobial Resistance** | |
| Cefdinir | 14 mg/kg/day (maximum 600 mg/day) orally in a single dose or divided into two doses |
| Cefpodoxime | 10 mg/kg/day (maximum 400 mg/day) |
| Ceftriaxone | (50 mg/kg/day every 12 hours; maximum 2 g/day) |
| **Anaphylactic Hypersensitivity Reaction to Penicillin** | |
| levofloxacin | 10–20 mg/kg/day (maximum 500 mg/day) |

## Attachment 8: Management of Acute Otitis Media in Pediatrics

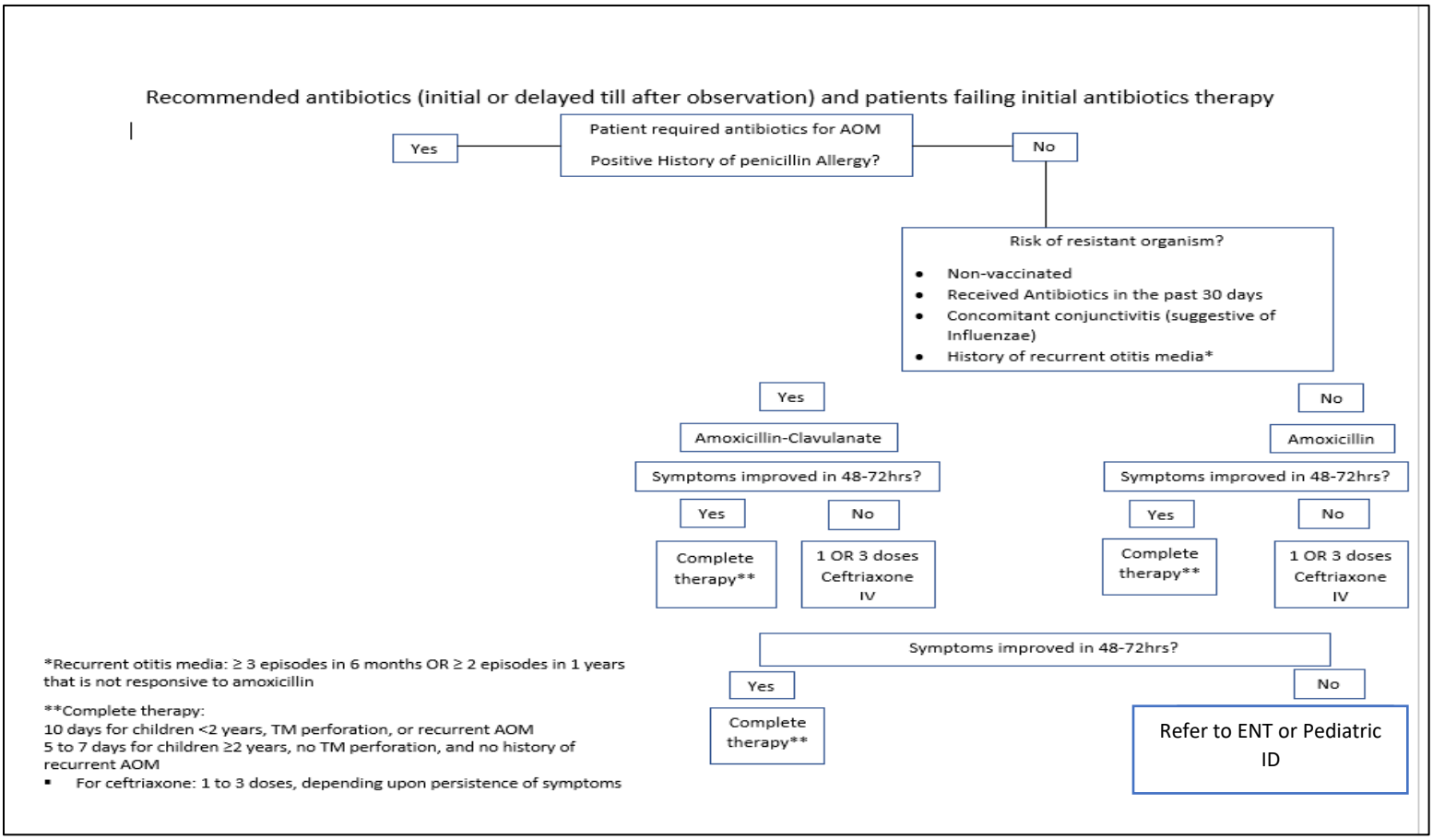
| | Otorrhea with Acute otitis media* | Unilateral OR bilateral AOM with severe symptoms** | Bilateral Acute otitis media without otorrhea | Unilateral AOM without otorrhea |
|---|---|---|---|---|
| 6 months -2 years | **Antibiotics** | **Antibiotics** | **Antibiotics** | **Antibiotics** |
| ≥ 2 years | **Antibiotics** | **Antibiotics** | **Antibiotics OR additional observation** | **Antibiotics OR additional observation*** ** |

*Applies to well documented examination
**Toxic-appearing, persistent otalgia > 48 hrs., Temperature ≥39° C for 48hrs, or cannot ensure follow-up
*** Mild symptoms (mild pain <48hrs and Temperature < 39° C)

## Attachment 9: Empiric Antibiotics for Acute Otitis Media in Pediatrics

<table>
<tr><th colspan="2">No Penicillin Allergy</th></tr>
<tr><td colspan="2">Amoxicillin:<br>• Is the antibiotic of choice if:<br>- The child has not received amoxicillin in the past 30 days.<br>- The child does not have concurrent purulent conjunctivitis.<br>• Dose: High dose Amoxicillin (90 mg/kg per day in 2 doses).<br>• Follow up the response to treatment within 48-72 hours.<br>• Duration:<br>- 10 days for children <2 years, TM perforation, or recurrent AOM.<br>- 5 to 7 days for children ≥2 years, no TM perforation, and no history of recurrent AOM.</td></tr>
<tr><td colspan="2">Amoxicillin-clavulanate:<br>• Is the antibiotic of choice if:<br>- The child has received amoxicillin in the last 30 days.<br>- The child has concurrent purulent conjunctivitis.<br>- History of recurrent AOM unresponsive to amoxicillin.<br>- If the child failed the initial Amoxicillin therapy<br>• Dose: High-dose amoxicillin-clavulanate (90 mg/kg per day of amoxicillin component, with 6.4 mg/kg per day of clavulanate in 2 divided doses).<br>• Duration: as above.</td></tr>
<tr><td colspan="2">Ceftriaxone:<br>• In children who are vomiting or if there are situations in which oral antibiotics cannot be administered.<br>• Ceftriaxone (50 mg/kg per day) for three consecutive days, either intravenously or intramuscularly.<br>• De-escalation to oral antibiotic should be done as soon as the child can take orally</td></tr>
<tr><th colspan="2">Penicillin Allergy</th></tr>
<tr><th>IgE mediated</th><th>Mild non IgE mediated</th></tr>
<tr><td>• Azithromycin as a single dose of 10 mg/kg, OR<br>• Clarithromycin (15 mg/kg per day in 2 divided doses), OR<br>• Clindamycin 30 mg/kg per day orally divided into three doses (maximum 1.8 g/day</td><td>• Cefdinir (14 mg/kg per day in 1 or 2 doses), OR<br>• Cefpodoxime (10 mg/kg per day, once daily), OR<br>• Cefuroxime (30 mg/kg per day in 2 divided doses), OR<br>• Cefuroxime tablets 250 mg orally every 12 hours for children who weigh >17 kg and can swallow the tablet whole, OR<br>• IV ceftriaxone.</td></tr>
</table>

## Attachment 10: Management of Acute Otitis Media in Pediatrics



## Attachment 11: Westley Croup Severity Score

| Clinical feature | Assigned score |
|---|---|
| **Level of consciousness** | Normal, including sleep = 0<br>Disoriented = 5 |
| **Cyanosis** | None = 0<br>With agitation = 4<br>At rest = 5 |
| **Stridor** | None = 0<br>With agitation = 1<br>At rest = 2 |
| **Air entry** | Normal = 0<br>Decreased = 1<br>Markedly decreased = 2 |
| **Retractions** | None = 0<br>Mild = 1<br>Moderate = 2<br>Severe = 3 |

| **Severity of croup based on Westley croup score** | | | | |
|---|---|---|---|---|
| Severity | Mild | moderate | Severe | Impending respiratory failure |
| Westly score | ≤2 | 3 to 7 | ≥8 | ≥12 |
| Description | • no stridor at rest (although stridor may be present when upset or crying),<br>• a barking cough,<br>• hoarse cry,<br>and either no or only mild chest wall/subcostal retractions | • stridor at rest,<br>• have at least mild retractions,<br>• and may have other symptoms or signs of respiratory distress,<br>little or no agitation | • stridor at rest,<br>• Retractions are severe<br>• anxious, agitated,<br>pale and fatigued. | • Fatigue and listlessness<br>• Marked retractions<br>• Decreased or absent breath sounds<br>• Depressed level of consciousness<br>• Tachycardia out of proportion to fever<br>• Cyanosis or pallor |

## Attachment 12: Empiric Antibiotic Therapy for Acute Epiglottitis in Pediatrics

| **Two drug regimens** | |
|---|---|
| Ceftriaxone | 50 – 100 mg/kg daily or in 2 divided doses |
| OR | |
| Cefotaxime | 150-200mg/kg/day divided in 4 doses |
| **PLUS** | |
| Vancomycin | 40-60mg/kg/day in 3 – 4 divided doses<br>Maximum dose 2 grams |
| OR | |
| Clindamycin | 30-40mg/kg/dose in 3 divided doses<br>Maximum 2.7 grams |

## Attachment 13: Cumulative Antimicrobial Susceptibility Pediatric Age, Gram-positive Antibiogram (UAE 2022)

1 January 2020 to 31 December 2022, Percent susceptible isolates (%S), Gram-positive bacteria (N=2,036)

**Isolates from children (0-16), upper respiratory tract sources (throat only)**

| Organism | Number of patients | AMX | AMC | AMP | AZM | FEP | CTX | FOX | CRO | CHL | CIP | CLI | DAP | DOX | ERY | GEN | LVX | LNZ | MFX | OFX | OXA | PEN | RIF | TEC | TCY | TGC | SXT | VAN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Staphylococcus aureus | 365 | | 79 | 6 | | | | 66 | | | 73 | 84 | 100 | 98 | 66 | 93 | 73 | 100 | 77 | | 70 | 10 | 100 | 99 | 91 | 100 | 88 | 99 |
| Streptococcus pyogenes (GAS) | 1,434 | 100 | 100 | 100 | | 100 | 100 | | 100 | 98 | | 83 | | | 56 | | 91 | 100 | 20 | | | 100 | | | 76 | | | 100 |
| Streptococcus, beta-haem. Group B (GBS) | 21 | | | | | | | | | | | 24 | | | 20 | | | | | | | | | | | | | |
| Streptococcus, beta-haem. Group C | 27 | | | | | | | | | | | 84 | | | | | | | | | | | | | | | | |
| Streptococcus, beta-haem. Group G | 40 | | | 100 | 79 | | | | 100 | | | 86 | | | | | | | | | | | | | 50 | | | 100 |
| Streptococcus dysgalactiae | 45 | 100 | | | | 97 | 100 | | | 93 | | 78 | | | 49 | | | 100 | | | | 100 | | | | | | 100 |
| Streptococcus pneumoniae | 39 | | | | | | | | 100 | 100 | | 69 | | | 56 | | 100 | 100 | 100 | | | 93 | 100 | | 68 | | 75 | 100 |

| Code | Antibiotic | Code | Antibiotic | Code | Antibiotic |
|---|---|---|---|---|---|
| AMX | Amoxicillin | CLI | Clindamycin | OXA | Oxacillin |
| AMC | Amoxicillin/Clavulanic acid | DAP | Daptomycin | PEN | Penicillin G |
| AMP | Ampicillin | DOX | Doxycycline | RIF | Rifampin |
| AZM | Azithromycin | ERY | Erythromycin | TEC | Teicoplanin |
| FEP | Cefepime | GEN | Gentamicin | TCY | Tetracycline |
| CTX | Cefotaxime | LVX | Levofloxacin | TGC | Tigecycline |
| FOX | Cefoxitin | LNZ | Linezolid | SXT | Trimethoprim/Sulfamethoxazole |
| CRO | Ceftriaxone | MFX | Moxifloxacin | VAN | Vancomycin |
| CHL | Chloramphenicol | NIT | Nitrofurantoin | | |
| CIP | Ciprofloxacin | OFX | Ofloxacin | | |

## Attachment 14: Cumulative Antimicrobial Susceptibility Pediatric Age, Gram-negative Antibiogram (UAE 2022)

January 2020 to 31 December 2022, Percent susceptible isolates (%S[a]), Gram-negative bacteria (N=354)
**Isolates from children (0-16), upper respiratory tract sources (throat only)**

| Organism | Number of patients | AMK | AMC | AMP | ATM | FEP | CFM | CTX | CAZ | CRO | CXM | CIP | ETP | GEN | IPM | LVX | MEM | NOR | PIP | TZP | TCY | TIC | TCC | TOB | SXT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pseudomonas aeruginosa | 123 | 96 | | | | 91 | | | 93 | | | 92 | | 93 | 92 | | 93 | | 80 | 88 | | | 53 | 97 | |
| Klebsiella pneumoniae | 58 | 100 | 91 | | 61 | 97 | 64 | 75 | 82 | 65 | 71 | 80 | 91 | 98 | 100 | 92 | 96 | 100 | | 96 | | | | 91 | 84 |
| Haemophilus influenza | 39 | | 78 | 65 | | | | | | 93 | | 100 | | | | 100 | | | | | 57 | | | | |

| Code | Antibiotic | Code | Antibiotic | Code | Antibiotic |
|---|---|---|---|---|---|
| AMK | Amikacin | CXM | Cefuroxime | NOR | Norfloxacin |
| AMC | Amoxicillin/Clavulanic acid | CIP | Ciprofloxacin | PIP | Piperacillin |
| AMP | Ampicillin | COL | Colistin | TZP | Piperacillin/Tazobactam |
| ATM | Aztreonam | ETP | Ertapenem | TCY | Tetracycline |
| FEP | Cefepime | GEN | Gentamicin | TIC | Ticarcillin |
| CFM | Cefixime | IPM | Imipenem | TCC | Ticarcillin/Clavulanic acid |
| CTX | Cefotaxime | LVX | Levofloxacin | TOB | Tobramycin |
| CAZ | Ceftazidime | MEM | Meropenem | SXT | Trimethoprim/Sulfamethoxazole |
| CRO | Ceftriaxone | NIT | Nitrofurantoin | | |