

History of Antibiotic Therapy amongst Patients Presenting with Odontogenic Infections to a Pediatric Emergency Department

Lim HJ, Chapman M



Purpose

The aim of this project was to analyze frequency of and trends in previously-prescribed antibiotic therapy amongst pediatric patients presenting with odontogenic facial swelling to a children’s hospital emergency department (ED).

Introduction

Dental pain, infection and facial swelling are common reasons for ED visits for pediatric patients. This trend of seeking urgent dental care in the ED has been continuing to increase^{1,2}. Often, these patients present with a recent history of antibiotic therapy, prescribed by an outside clinician, which has been ineffective in alleviating symptoms and require more urgent intervention. Previous studies have shown that 30 - 85% of dental antibiotic prescriptions are unnecessarily or sub-optimally prescribed³. The goal of this study is to analyze the occurrence rates of existing antibiotic therapy, type and duration of therapy, and correlation between antibiotic therapy with severity of facial swelling. This study hopes to inform improved antibiotic stewardship in the management of dental infections.

Methods

Patients presenting to the Children’s Hospital of Pittsburgh ED from 1/28/2021 to 11/8/2024 requiring a dental consult were included. Charts were identified using the code “SEEN IN ED”, which is tied to any visit which the dental resident presented for a consult. Visit notes were manually reviewed to only select consults due to dental pain/infection requiring urgent extractions. The following data were collected from the visit note: 1) date of service; 2) patient medical record number (MRN); 3) age at presentation; 4) degree of swelling (mild/moderate/severe); 5) history of antibiotic therapy; 6) type of antibiotic; and 7) duration of antibiotic therapy. Data was analyzed using t-tests with residuals to determine statistical significance and resulting p-values were determined.

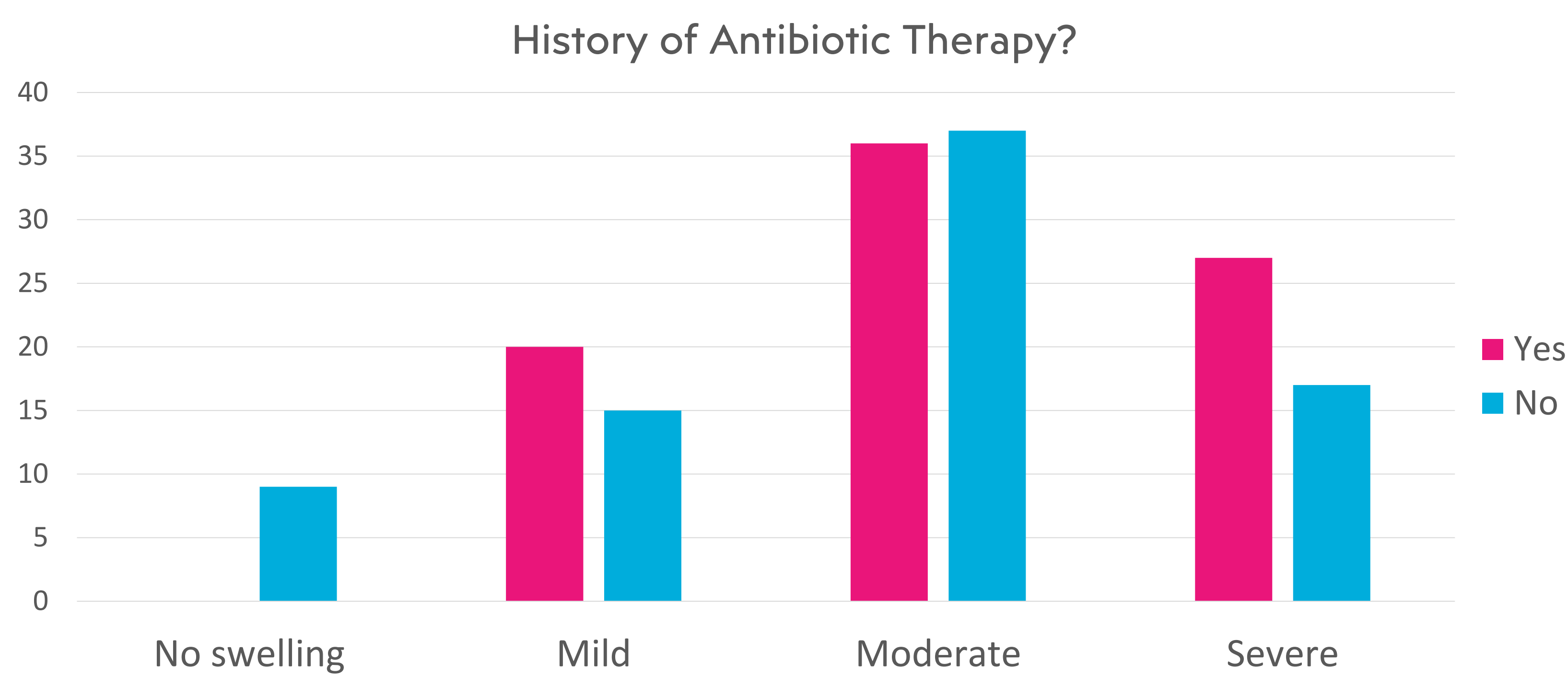


Figure 1. History of antibiotic therapy and degree of facial swelling

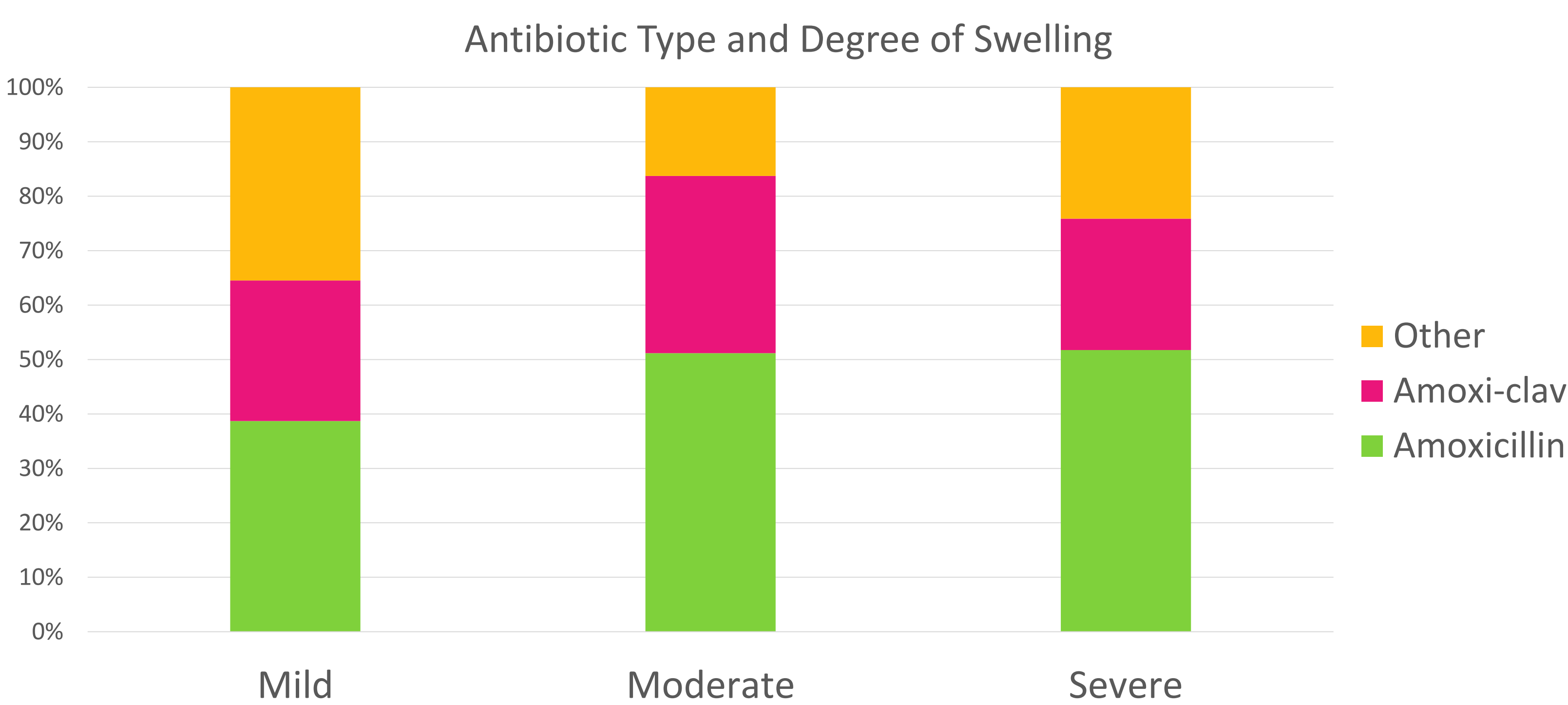


Figure 2. Antibiotic type and degree of facial swelling

Conclusion

This study highlights the importance of access to both acute and preventative dental care. Ineffective antibiotic therapy without immediate, definitive treatment may prolong or worsen symptoms, leading to costly ED visits, hospitalizations, and antibiotic resistance. While antibiotic stewardship includes use of narrowest-spectrum antibiotics to minimize disruption to other microbiome, broader-coverage antibiotics such as amoxi-clav should be considered in patients who are immunocompromised or have limited access to care to minimize risk of severe progression of facial swelling.

Results

161 charts satisfying the inclusion criteria were identified. 52% of patients presented with history of antibiotic therapy. Out of this group, 30% had previously received amoxicillin, and 18% had previously received amoxicillin-clavulanic acid (amoxi-clav). 8% had received multiple types of antibiotics prior to ED presentation. Patients presenting with facial swelling were more likely to have a history of antibiotic therapy than not ($p<0.01$). 17% of patients presenting with antibiotic therapy and facial swelling had completed >5 days of antibiotics at the time of the ED visit. Out of patients with <2 days of amoxicillin therapy, more patients presented with severe swelling than expected, whereas fewer patients presented with mild swelling than expected ($p<0.05$). In contrast, amoxi-clav did not present any unexpected prevalences of swelling of various severity based on duration of therapy.

Discussion

A majority of pediatric ED visits related to odontogenic facial swelling requiring urgent management present with previously-prescribed antibiotic therapy. Our findings were consistent with other studies in that amoxicillin is the most prescribed antibiotic for dental problems⁴. Our data implies that amoxicillin is mostly effective in managing mild infections -- when it truly is effective, it works quickly and is effective in containing the degree of swelling. However, the higher-than-expected number of severe swelling cases amongst short-term amoxicillin users may indicate that when it is not effective, perhaps in the presence of resistant bacteria, swelling often progresses very quickly. In contrast, amoxi-clav demonstrated a more consistent relationship between the degree of swelling and duration of pre-existing therapy. Amoxi-clav notably inhibits B-lactamase production and shows low resistance against bacteria cultivated from dental infections, which may contribute to its greater effectiveness when compared to amoxicillin⁵.

References: 1) Baker L, Munnich EL, Kranz AM. Medicaid managed care and pediatric dental emergency department visits. *JAMA Health Forum.* 2024;5(6):e241472. doi:10.1001/jamahealthforum.2024.1472. 2) Ladrillo TE, et al. Increasing prevalence of emergency department visits for pediatric dental care, 1997-2001. *J Am Dent Assoc.* 2006;137(3):379-385. 3) Lockhart PB, Tampi MP, Abt E, Aminoshariae A, Durkin MJ, Fouad AF, Gopal P, Hatten BW, Kennedy E, Lang MS, Patton LL, Paumier T, Suda KJ, Pilcher L, Urquhart O, O'Brien KK, Carrasco-Labra A. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling: A report from the American Dental Association. *J Am Dent Assoc.* 2019;150(11):906-921.e12. doi:10.1016/j.adaj.2019.08.020. 4) Ahmadi H, Ebrahimi A, Ahmadi F. Antibiotic therapy in dentistry. *Int J Dent.* 2021;2021:6667624. doi:10.1155/2021/6667624. 5) Segura-Egea JJ, Gould K, Şen BH, Jonasson P, Cotti E, Mazzoni A, Sunay H, Tjäderhane L, Dummer PMH. Antibiotics in endodontics: a review. *Int Endod J.* 2017;50(12):1169-1184. doi:10.1111/iej.12741. PMID: 28005295.