Changes in Dental Antibiotic Prescribing in the United States, 2012-2017

SCHOOL OF PUBLIC HEALTH
UIC

Mailing: 833 S Wood St, Chicago, IL 60612
E-mail: sraman21@uic.edu
Telephone: (708) 202-4442

Swetha Ramanathan, MPH[1,2], Connie H. Yan, PharmD[3], Colin Hubbard, PhD[1], Gregory S. Calip, PharmD, MPH, PhD[3], Lisa K. Sharp, PhD[3], Charlesnika T. Evans, PhD,MPH[2,4], Susan Rowan, DDS, MS[5], Jessina C. McGregor, PhD[6], Alan E. Gross, PharmD[3], Allen Campbell[7], Ronald C. Hershow, MD[1], Katie J. Suda, PharmD, MS[8,9]

[1]University of Illinois at Chicago, School of Public Health | Chicago, IL, [2]Center of Innovation for Complex Chronic Healthcare, Hines VA Hospital| Hines, IL, [3]University of Illinois at Chicago, College of Pharmacy |Chicago, IL, [4]Northwestern University Feinberg School of Medicine | Chicago, IL, [5]University of Illinois at Chicago, College of Dentistry| Chicago, IL, [6]Oregon State University, College of Pharmacy | Portland OR, [7]The IQVIA Institute for Human Data Science | Durham, NC, [8]Center for Health Equity Research and Promotion, VA Pittsburgh Healthcare System, Pittsburgh, PA, [9]University of Pittsburgh, Department of Medicine | Pittsburgh, PA,

Introduction

- Dentists account for 10% of antibiotic prescriptions (Rx) in the US and are the top specialty prescriber of antibiotics.[1]
- Common reasons for dental antibiotic prescriptions include acute dento-alveolar infection, pericoronitis, and infection prophylaxis.[2,3]
- Recent data demonstrates increasing trends in dental antibiotic prescribing while prescribing by medical clinicians has decreased.[4,5]
- However, data is scare on current antibiotic prescribing by US dentists from 2012-2017.
- Specifically the goal was to evaluate trends in antibiotic prescribing in adults and children, overall and by antibiotic agent.

Methods

- This was a cross-sectional study using IQVIA Longitudinal Prescription Data form 2012-2017.
- Prescribing rates [Rx per 100,000 dentists], mean days supply, and mean quantity dispensed were calculated monthly.
- Data was classified into 8 oral pill antibiotic groups: amoxicillin, clindamycin, cephalexin, azithromycin, penicillin, doxycycline, fluoroquinolone, and other antibiotics.
- Descriptive frequencies and multiple linear regressions were performed to obtain trends overall, and stratified by adults (≥ 18) and children (<18).
- All analysis was performed with SAS 9.6.

Results

- 135 million prescriptions were prescribed by 220,325 dentists, with 94% of prescriptions in adults

	Total (%)	Mean Quantity Dispensed (SD)	Mean Days Supply (SD)
All antibiotics	100	27.4	7.4
Amoxicillin	61	27.8	7.3
Clindamycin	14.4	27.7	7.0
Penicillin	11.7	28.0	7.3
Azithromycin	4.4	6.4	5.0
Cephalexin	4.3	32.7	7.5
Doxycycline	1.4	33.4	18.8
Fluoroquinolones	0.7	8.7	8.7
Other	2.0	8.5	8.5

Figure 1. Changes in monthly antibiotic prescribing rate, by antibiotic classes from 2012 to 2017

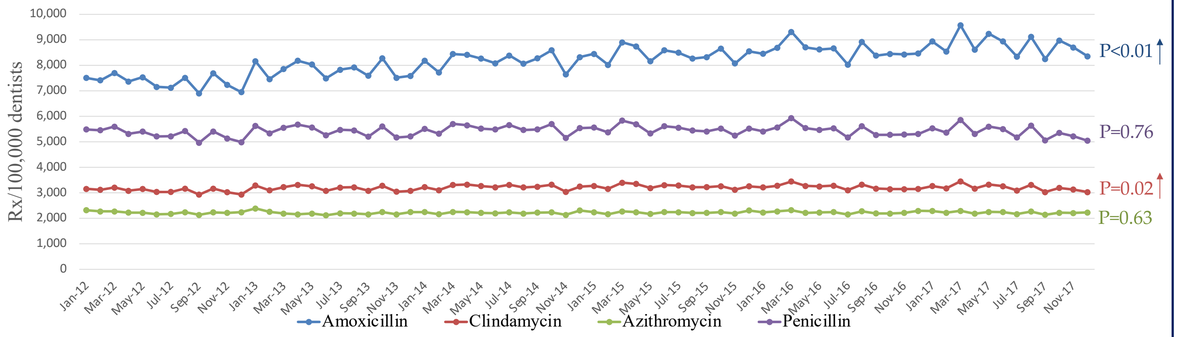
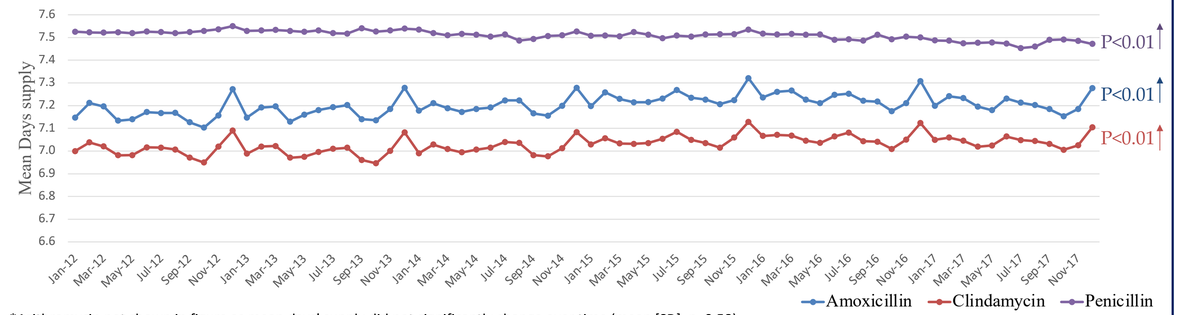


Figure 2. Changes in monthly average antibiotic days supply, by antibiotic classes from 2012 to 2017



*Azithromycin not shown in figure as mean days' supply did not significantly change over time (mean [SD], p=0.58)

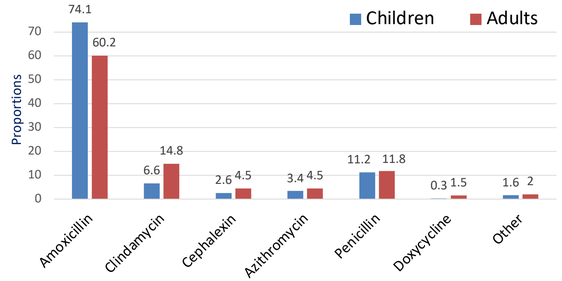
Table 1. Changes in antibiotic prescribing rates per month, overall and stratified by age group*

Antibiotic	Overall Rates (95%CI)	P-value	Adults Rates (95%CI)	P-value	Children Rates (95%CI)	P-value
All antibiotics	32.5 (32.0-33.0)	<0.01	39.3 (39.0-39.4)	<0.001	1.7 (1.60-1.80)	<0.01
Amoxicillin	72.7 (59.7-85.6)	<0.01	72.8 (59.7-86.0)	<0.0001	4.6 (2.5- 6.7)	<0.01
Clindamycin	4.8 (0.8-8.7)	0.02	4.8 (0.8-8.8)	0.02	1.3 (0.08-2.4)	0.04
Cephalexin	-7.5 (-10.6- -4.4)	<0.01	-7.4 (-10.5- 14.2)	<0.0001	2.0 (-0.1- 4.0)	0.06
Azithromycin	0.46 (-1.4-2.4)	0.63	0.5 (-1.3- 2.3)	0.57	1.2 (0.2- 2.3)	0.02
Penicillin	1.2 (-6.4-8.7)	0.76	1.9 (-5.8- 9.7)	0.62	6.1 (2.5-9.7)	<0.01
Doxycycline	-12.2 (-14.0- -10.5)	<0.01	-12.0 (-13.8 -10.3)	<0.001	-3.2 (-4.8- -1.6)	<0.01
Fluroquinolone	-2.0 (-3.6- -0.06)	0.008	-2.0 (-3.5- -0.5)	0.01	-4.0 (-5.7 - -2.2)	<0.01
Other	-0.6 (-2.0- 0.7)	0.35	-0.3 (-1.7- 1.1)	0.67	0.24 (-0.6 – 1.1)	0.58

*Prescribing rates are in prescriptions per 100,000 dentists

Results

Figure 3. Overall proportion of antibiotics classes prescribed by dentists in adults and children, 2012 to 2017



Conclusions

- Dental antibiotic prescribing is increasing in the U.S., especially with amoxicillin and clindamycin.
- Mean days supply increased for amoxicillin, penicillin, and clindamycin.
- This is particularly concerning as clindamycin is associated with increased risk of *Clostridioides difficile* infection. [6]
- Trends were different between adults and children, particularly in prescribing rates for antibiotic classes.
- Understanding what is driving the increase in prescribing rates and days supply is important to target antibiotic stewardship efforts among dentists.

References and Disclaimer

This study was supported by Agency for Healthcare Research and Quality grant R01 HS25177 (PI: Suda).
The opinions expressed are those of the authors and do not represent those of the Agency for Healthcare Research and Quality, the Department of Veterans Affairs, the U.S. Government, or IQVIA or any of its affiliated or subsidiary entities
There are no conflicts of interest.

1. Hicks LA, Bartoces MG, Roberts RM, et al. US Outpatient Antibiotic Prescribing Variation According to Geography, Patient Population, and Provider Specialty in 2011. *Clinical Infectious Diseases*. 2015;60(9):1308-1316.
2. Sturrock A, Landes D, Robson T, Bird L, Ojelabi A, Ling J. An audit of antimicrobial prescribing by dental practitioners in the north east of England and Cumbria. *BMC Oral Health*. 2018;18(206):1-8.
3. Thornhill MH, Dayer MJ, Prendergast B, Baddour LM, Jones S, Lockhart PB. Incidence and nature of adverse reactions to antibiotics used as endocarditis prophylaxis. *J Antimicrob Chemother*. 2015;70:2382-2388.
4. King E, Bartoces M, Fleming-Dutra KE, Roberts RM, Hicks LA. Changes in US Outpatient Antibiotic Prescriptions from 2011-2016. *Clin Infect Dis*. Published online 2019:Epub ahead of print].
5. Roberts RM, Bartoces MG, Thompson SE, Hicks LA. Antibiotic prescribing by general dentists in the United States, 2013. *JADA*. 2017;148(3):172-178.
6. Thornhill MH, Dayer MJ, Prendergast B, Baddour LM, Jones S, Lockhart PB. Incidence and nature of adverse reactions to antibiotics used as endocarditis prophylaxis. *J Antimicrob Chemother*. 2015;70:2382-2388