

Antibiotic Prescribing by Dentists and Geographic Variability in the Veterans Affairs (VA) Health System

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Background

- Dentists account for 10% of all antibiotics prescribed in the United States. However, very little is currently known about the prescribing of oral antibiotics in the dental setting.
- As antibiotics continue to account for a large portion of outpatient medications prescribed, antimicrobial stewardship is rapidly expanding. On January 1, 2017, The Joint Commission issued a new Antimicrobial Stewardship Standard for hospitals, critical access hospitals, and nursing care centers to mandate the existence of an evidence-based antimicrobial stewardship program. Similarly, the Centers for Diseases Control and Prevention (CDC) has released The Core Elements of Outpatient Antibiotic Stewardship, which specifically include dentists and dental clinics as having an important role in stewardship.
- Dentists prescribe antibiotics for infection prophylaxis and treatment of oral infections. While some guidance exists for the prescribing of antibiotics for infection prophylaxis for patients with cardiac conditions and prosthetic joints, no guidelines currently exist for the prescribing of antibiotics for the treatment of oral infections.
- Even though dentists prescribe a significant proportion of antibiotics, there are no large-scale data examining indications for antibiotics in the dental setting. Also, a visit-based prescribing rate for dentists has never been identified.
- As the largest provider of oral health care in the U.S., the Department of Veterans Affairs (VA) Health System delivers approximately 1.7 million dental visits annually to approximately 500,000 Veterans.
- VA dentists code with diagnostic (ICD codes) and procedure codes, whereas private sector dentists typically only use procedure-based coding (CDT codes). Therefore, this unique system provides an opportunity to evaluate indications for medications prescribed by dentists.

Objectives

Our aims were to:

- Describe national dental antibiotic prescribing practices, including the indication and duration of antibiotics, and the visit-based antibiotic prescription rate.
- Determine differences in geographic dental prescribing by duration, class, and spectrum of activity.

Methods

- Study design:** Cross-sectional cohort study.
- Patient population:** Veterans who had an outpatient dental visit and/or received an antibiotic prescription (Rx) prescribed by a dentist were identified from the national VA Corporate Data Warehouse (CDW) data sets.
- Study period:** January 1, 2013 – December 31, 2013.
- Data collection:** National VA medical, dental, and pharmacy datasets were used to collect information.
- Study definitions:**
 - Broad spectrum antibiotics were defined as those agents in the carbapenem, quinolone, anti-pseudomonal penicillin, 3rd/4th generation cephalosporin, macrolide, tetracycline, and aminoglycoside classes
 - Indications were categorized as infection prophylaxis or treatment of an oral infection:
 - Infection Prophylaxis:
 - Antibiotic with a day supply < 2 days prescribed on any day prior to dental visit
 - Antibiotic with a day supply ≥ 2 days prescribed prior to a visit (no oral infection ICD-9)
 - Antibiotic prescribed on the day of or up to 7 days post-visit (no oral infection ICD-9)
 - Treatment of an Oral Infection:
 - Antibiotic with day supply ≥ 2 days prescribed any day prior to visit (with oral infection ICD-9)
 - Antibiotic prescribed on the day of or up to 7 days post-visit (with oral infection ICD-9)

- Geographic regions were defined according to U.S. Census Bureau regions.
- Statistical analysis:** SAS 9.4 (SAS Institute, Cary, NC) was used for data and statistical analyses. Independent t-test, Kruskal-Wallis test, X² test, and Fisher's exact test were applied as appropriate. A p value ≤ 0.05 was considered statistically significant.

Table 1. Characteristics of Veterans Prescribed Antibiotics by a Dentist

	Overall (n=476,428)
Age, Mean ± StDev (Range)	59.6 ± 14.7 (20-102)
Male gender, n (%)	436,417 (91.6)
Race, n (%)	
White	322,426 (67.7)
Black or African American	105,466 (21.1)
Other*	15,038 (3.2)
Missing	33,498 (7.0)
Ethnicity, n (%)	
Hispanic	33,612 (7.0)
Non-Hispanic	425,324 (89.3)
Missing	17,492 (3.7)

* Other=Asian, Native Hawaiian, Pacific Islander, Native American, Alaska Native

Figure 1. Antibiotics Prescribed by a Dentist

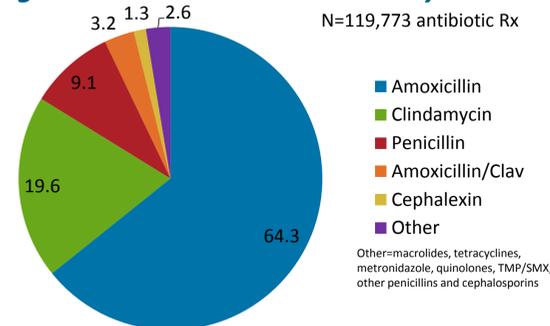


Table 2. Antibiotic Duration and Prescribing Rate Overall and by Region

Region*	Duration Mean±StDev (Range)	Antibiotic Prescribing Rate (Rx/1000 visits)
Overall	7.8±8.5 (1-90)	68.8
Northeast	8.2±8.5 (1-90)	57.2
Midwest	8.1±10.1 (1-90)	72.3
South	7.3±6.6 (1-90)	68.1
West	8.5±10.2 (1-90)	74.9
Puerto Rico	5.8±3.9 (1-30)	76.9

*As compared to the West, all other regions had shorter durations (p<0.01).

Figure 2. Overall Visit-Based Antibiotic Prescribing Rate by State (Rx/per 1000 visits)

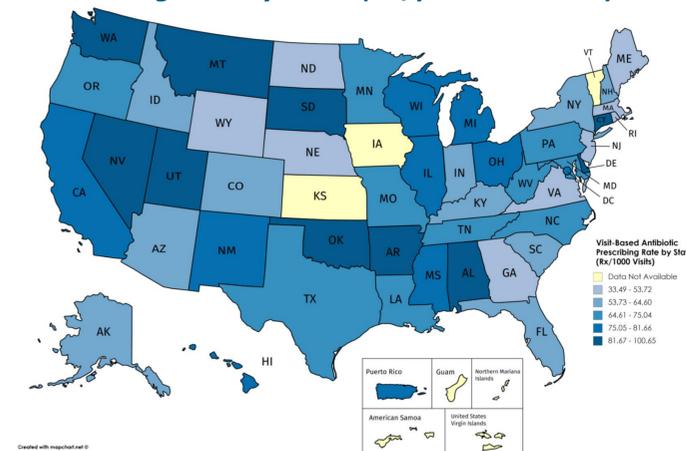


Table 3. Dental Prescribing of Clindamycin as compared to β-Lactams by Region

Region	Clindamycin Rx N (%)	β-Lactam Rx N (%)	RR (95% CI)
Northeast	2,534 (16.6)	12,264 (80.2)	0.86 (0.83-0.90)
Midwest	4,358 (19.1)	17,791 (78.1)	0.99 (0.96-1.00)
South	10,678 (20.7)	39,692 (76.9)	1.07 (1.04-1.10)
West	5,531 (19.4)	22,401 (78.4)	-REF-
Puerto Rico	378 (25.0)	1,090 (72.0)	1.30 (1.19-1.42)

Conclusions

- This is the first U.S. study to describe indications for antibiotics prescribed by dentists, with the majority for infection prophylaxis.
- Amoxicillin comprised the majority of antibiotics; clindamycin represented 1 in 5 antibiotics prescribed by dentists.
- Geographic variability was also observed for the dental visit-based prescribing rate and the antibiotic duration with the Western U.S. and Puerto Rico having the longest duration and highest regional prescribing rate.
- With dentists included in national guidance for implementing antibiotic stewardship, this is an important first step to inform targeted antimicrobial stewardship efforts.

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- The views expressed in this presentation are those of the presenters and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the U.S. Government.

Figure 3. Proportion of Antibiotics Prescribed for Prophylaxis and Treatment

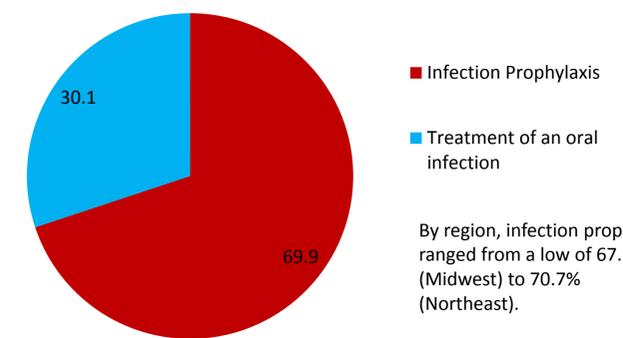


Figure 4. Visit-Based Rate by Indication (Rx/per 1000 visits)

