

Antibiotic Prophylaxis Prior to Dental Visits in the Veterans Health Administration (VHA), 2015-2018

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Background

- Antibiotic prophylaxis (AP) is recommended per guidelines prior to invasive dental visits in patients with certain cardiac conditions but is not recommended in patients with prosthetic joints.
- Meta-analyses indicate benefit of AP prior to dental implants and tooth extractions. Within dentistry, it is also common to prescribe AP in patients with immunocompromising conditions.
- Determining appropriateness of antibiotic prescribing by dentists has been challenging because dentists code using Comprehensive Dental Terminology (CDT) codes. Thus, it is difficult to associate a prescription with a diagnosis (e.g, ICD-10-CM).
- VHA dentists code using CDT and ICD9/10 codes. This provides an opportunity to accurately assess antibiotic prophylaxis by removing antibiotics associated with an oral infection.

Objectives

- To determine the appropriateness of antibiotic prophylaxis by dentists within VHA.
- To identify factors associated with unnecessary prescribing.

Methods

- Study design:** Cross-sectional study, 2015-2018.
- Population:** VHA dental visits with an antibiotic prescribed within 7 days before a visit were included. Antibiotics prescribed for an oral infection were excluded. Dental visits within 14 days were combined into a single observation where all codes are represented.
- Appropriate antibiotic prophylaxis (AP):** Visits with dental procedures that involved manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa and was further delineated into narrow (primary analysis) and broad definitions by medical comorbidities (See Table 2).

Methods (continued)

- Statistical analysis:** SAS 9.4 was used for data and statistical analyses. Poisson regression was applied to model the association of covariates with unnecessary AP; models were clustered by patient. A p value < 0.05 was considered statistically significant.

Results

- 15% of antibiotics were prescribed for the treatment of an oral infection and 85% were prescribed for AP (N=299,026 prescriptions; median=7 days).
- AP (74% amoxicillin, 17% clindamycin) was prescribed to 183,648 patients (mean age=61 years).

Table 1. Patient characteristics.

	Variable	Frequency (%)
Gender	Male	167,100 (91.0)
	Female	16,548 (9.0)
Age Group	18-44	22,656 (12.3)
	45-64	68,561 (37.3)
	>=65	92,431 (50.3)
	Missing	6,345 (3.5)
Race	White	122,745 (66.8)
	Black	47,472 (25.9)
	Other	7,086 (3.9)
	Missing	6,345 (3.5)
Rural/Urban	Urban	156,346 (85.1)
	Rural	20,827 (11.3)
	Missing	6,475 (3.5)
Co-morbidities	Cardiac condition	29,791 (16.2)
	Prosthetic joint	42,538 (23.2)
Region	Northeast	24,598 (13.4)
	Midwest	33,448 (18.2)
	South	83,717 (45.6)
	West	38,914 (21.2)
	Other	2971 (1.6)
	(Other=Puerto Rico)	

Cardiac conditions include prosthetic cardiac valve or material used for cardiac valve repair, previous infective endocarditis, certain congenital heart diseases, and cardiac transplant recipients with cardiac valvulopathy.

Table 2. Appropriateness of AP by definition.

	Criteria	Appropriate AP
Narrow definition (primary analysis)	Included patients with cardiac conditions at risk of an adverse outcome from infective endocarditis per guidelines.	15.1%
Broad definition	Included the above cardiac conditions, tooth extractions/ implants or immuno-compromising conditions.	71.9%

Immunocompromising conditions were defined as bone marrow transplant, stem cell transplant, solid organ transplant, rheumatoid arthritis, HIV/AIDS, neutropenia, inherited diseases of immunosuppression, cancer patients undergoing chemotherapy in the last year, immunosuppressive medications, and poorly controlled diabetes with a HbA1c ≥8 within the last year.

Figure 1. Unnecessary AP by geographic region (narrow definition*).

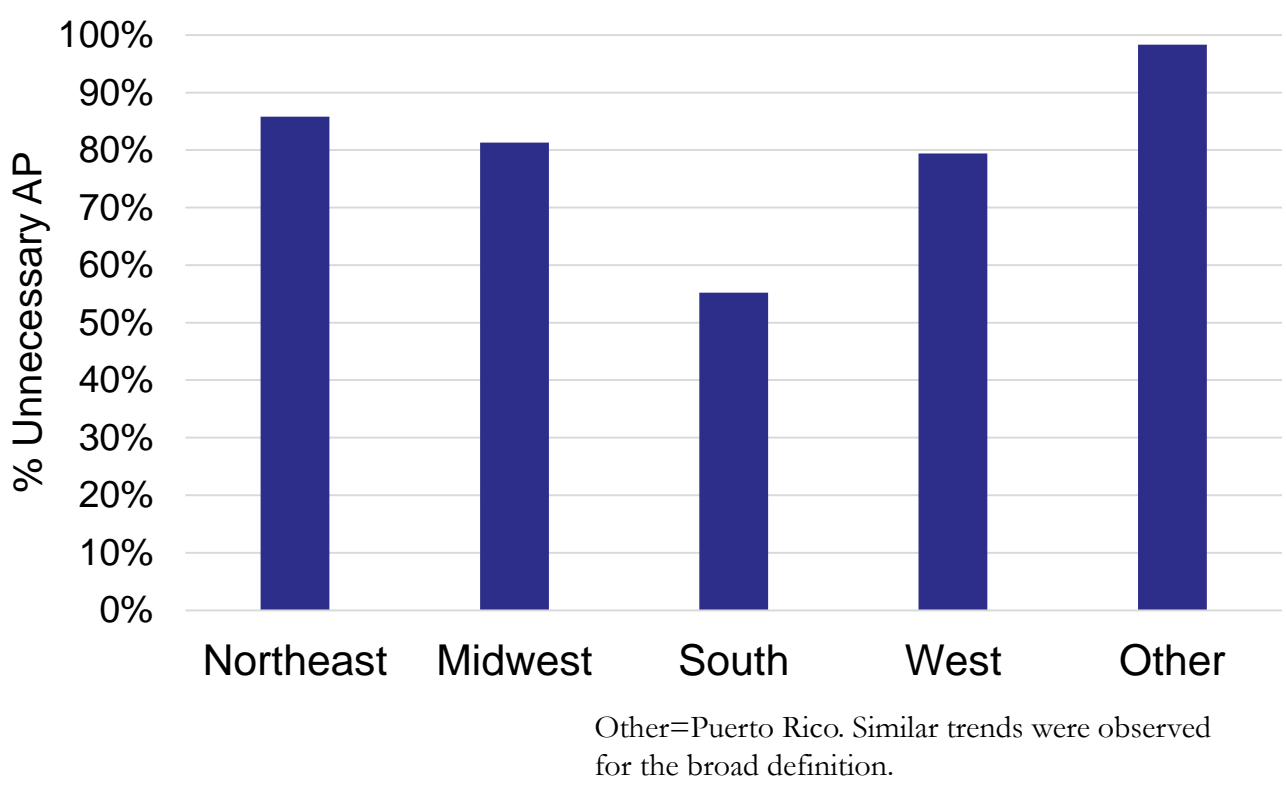
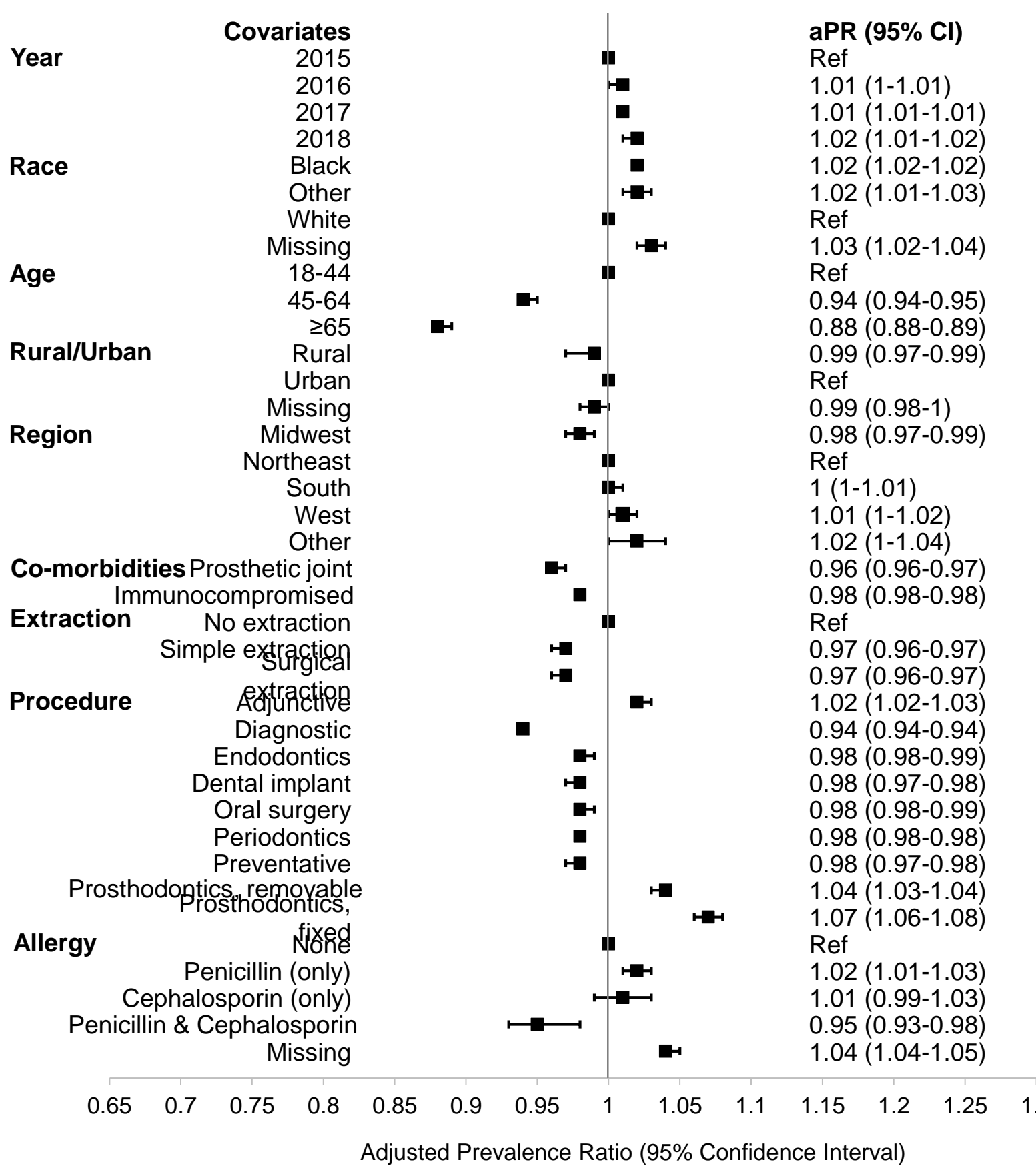


Figure 2. Characteristics associated with unnecessary AP (narrow definition).



Adjusted for Charlson co-morbidity index, facility complexity, and patient characteristics. Models were clustered by patient. Confidence intervals were calculated with robust standard errors.

Conclusions

- The majority of antibiotics were prescribed for **infection prophylaxis**.
- Four out of five** antibiotics prescribed for infection prophylaxis prior to a dental visit were inconsistent with clinical treatment guidelines, many for an **extended duration**.
- Unnecessary antibiotic prophylaxis **increased** over time.
- Guidelines are urgently needed** to inform if antibiotic prophylaxis is indicated for surgical tooth extractions, dental implants, and immunocompromised patients, common reasons dentists prescribe antibiotic prophylaxis.

Policy Implications

- Focusing on improving antibiotic prophylaxis duration and appropriateness may have **large implications for stewardship**.
- **Guidelines are urgently needed** to inform if antibiotic prophylaxis is indicated for surgical tooth extractions, dental implants, and immunocompromised patients, common reasons dentists prescribe antibiotic prophylaxis.
- Antimicrobial stewardship should also be targeted to **non-physician prescribers**.

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Variable		aPrevalence Ratios (95% CI)	p-value
Year	2015	Ref	---
	2016	1.01 (1-1.01)	0.001
	2017	1.01 (1.01-1.01)	<0.0001
	2018	1.02 (1.01-1.02)	<0.0001
Race	Black	1.02 (1.02-1.02)	<0.0001
	Other	1.02 (1.01-1.03)	<0.0001
	White	Ref	---
	Missing	1.03 (1.02-1.04)	<0.0001
Age group	18-44	Ref	---
	45-64	0.94 (0.94-0.95)	<0.0001
	>=65	0.88 (0.88-0.89)	<0.0001
Rural/Urban	Rural	0.99 (0.99-1)	0.044
	Urban	Ref	---
	Missing	0.99 (0.98-1)	0.059
Region	Midwest	0.98 (0.97-0.99)	<0.0001
	Northeast	Ref	---
	South	1 (1-1.01)	0.473
	West	1.01 (1-1.02)	<0.0001
	Other	1.02 (1-1.04)	0.049
Co-morbidities	Prosthetic joint	0.96 (0.96-0.97)	<0.0001
	Immunocompromised	0.98 (0.98-0.98)	<0.0001
Extraction type	No extraction	Ref	---
	Simple extraction	0.97 (0.96-0.97)	<0.0001
	Surgical extraction	0.97 (0.96-0.97)	<0.0001
Dental procedure categories	Adjunctive	1.02 (1.02-1.03)	<0.0001
	Diagnostic	0.94 (0.94-0.94)	<0.0001
	Endodontics	0.98 (0.98-0.99)	<0.0001
	Dental implant	0.98 (0.97-0.98)	<0.0001
	Oral surgery	0.98 (0.98-0.99)	<0.0001
	Periodontics	0.98 (0.98-0.98)	<0.0001
	Preventative	0.98 (0.97-0.98)	<0.0001
	Prosthodontics, Removable	1.04 (1.03-1.04)	<0.0001
	Prosthodontics, Fixed	1.07 (1.06-1.08)	<0.0001
Allergy	None	Ref	---
	Penicillin (only)	1.02 (1.01-1.03)	0.001
	Cephalosporin (only)	1.01 (0.99-1.03)	0.354
	Penicillin and cephalosporin	0.95 (0.93-0.98)	0.002
	Missing	1.04 (1.04-1.05)	<0.0001