



Targets for antimicrobial stewardship:

Variability in antibiotic prescribing among outpatient care providers

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Background

- Antimicrobial stewardship is essential to minimize unnecessary antibiotic use and curb the emergence of drug resistant pathogens.
- National trends in antibiotic prescribing have been discouraging, particularly in the adult outpatient setting:
 - Between 2000 and 2010 ,overall antibiotic prescriptions decreased by 18% among children, remained unchanged in adults, and increased by 30% in older adults.¹
 - In 2010, there were 833 antibiotic s per 1000 persons in the U.S., over twice the rate of antibiotic prescriptions in Sweden.²
- The purpose of this study is to:
 - Characterize outpatient antibiotic prescribing practices within a large academic healthcare network.
 - Identify factors associated with inappropriate prescribing in order to guide targeted interventions in antimicrobial stewardship.

Methods

- This was a retrospective study of primary care visits in 2014 within the University of Pennsylvania Health System.
- Patient de-identified data including antibiotic prescriptions and diagnoses were extracted from the medical record system using Teqqa (Teqqa, LLC, Jackson, WY).
- Visit diagnoses were classified into three tiers (see table below).
- Logistic regression was used to determine association of prescribing antibiotics for tier 3 diagnoses with provider degree, specialty, and type of practice.

Diagnostic category ³	Example diagnoses
Tier 1 – Antibiotics almost always indicated	Pneumonia, urinary tract infection, sexually transmitted infections, other miscellaneous bacterial infections
Tier 2 – Antibiotics may be indicated	Acne, pharyngitis, sinusitis, skin and mucosal infections, gastrointestinal infections, suppurative otitis media
Tier 3 – Antibiotics not indicated	Asthma, allergy, bronchitis, influenza, viral upper respiratory infections, non-suppurative otitis media, all other codes not listed elsewhere

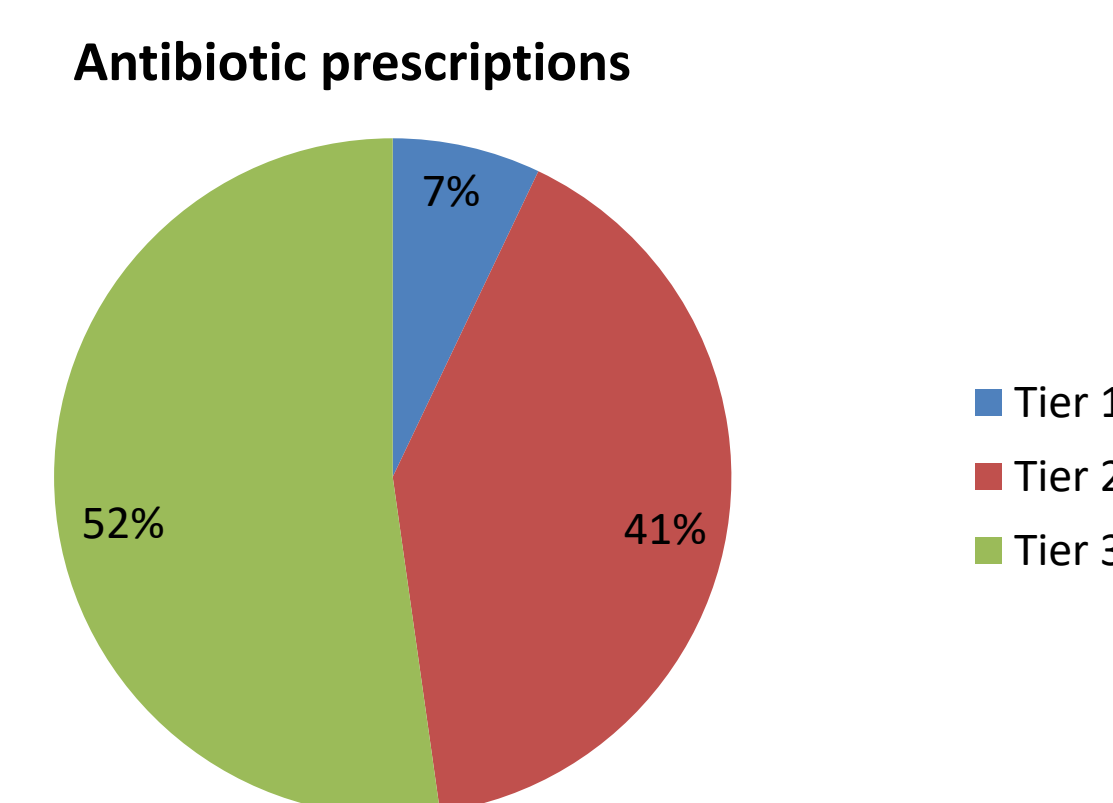
Categorization scheme adapted from Shapiro et al.³

Results

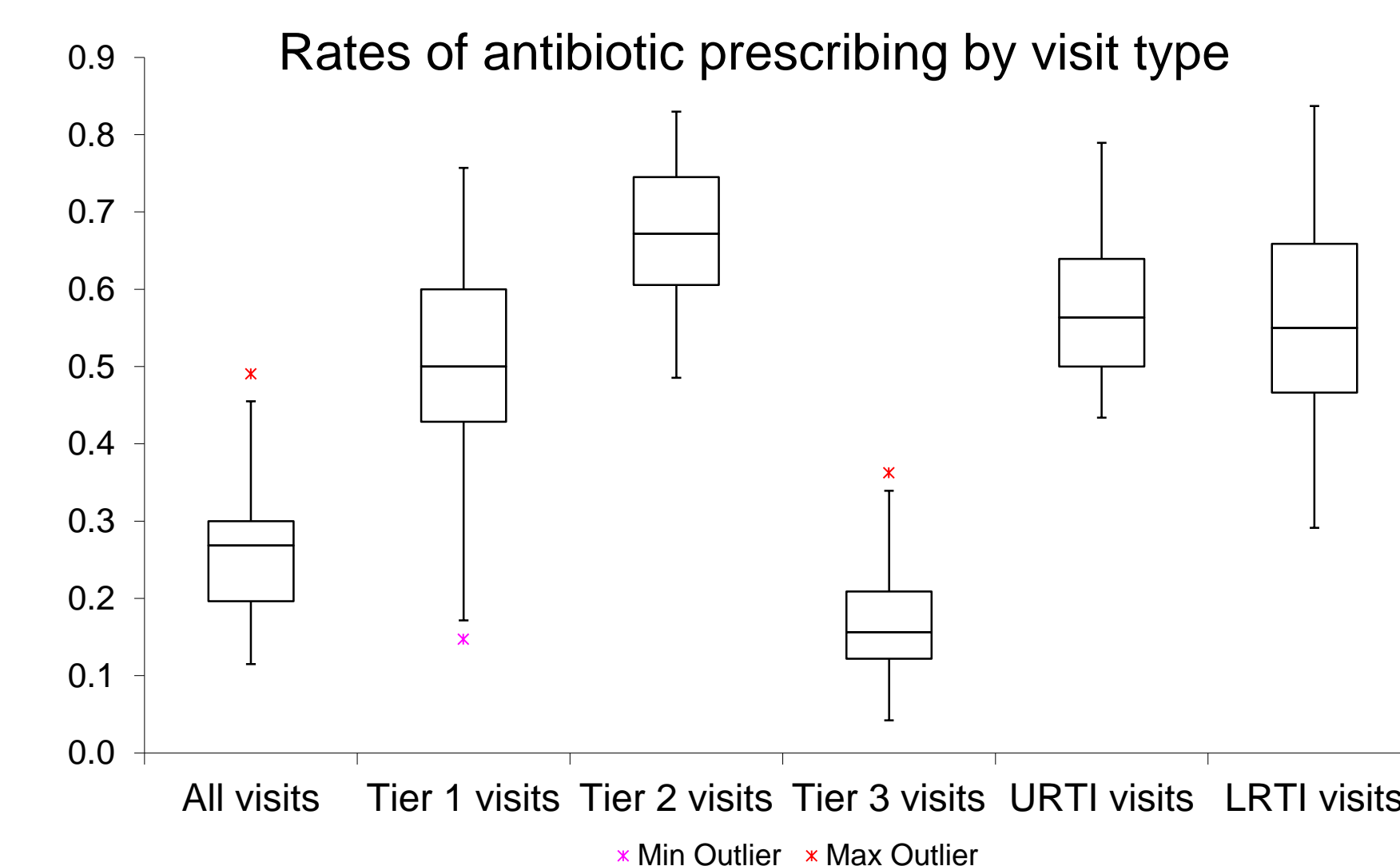
Provider characteristics		
	N (197 total)	%
Degree		
MD	137	69.5%
DO	21	10.7%
NP	30	15.2%
PA	9	4.6%
Specialty		
IM	116	58.9%
FM	81	41.1%
Type of practice		
Teaching	51	25.9%
Non-teaching	146	74.1%

Teaching = clinic sites at which trainees are present.

Among 197 primary care providers in the year of 2014, there were 222,105 total patient visits and 36,555 total antibiotic prescriptions. A majority of antibiotic prescriptions were associated with Tier 3 diagnoses.



As expected, there was a lower antibiotic prescribing rate among visits with Tier 3 diagnoses than those with Tier 1 or 2 diagnoses. However there was considerable variability in antibiotic prescribing rates between providers when stratifying by visit type.



Labels	All visits	Tier 1 visits	Tier 2 visits	Tier 3 visits	URTI visits	LRTI visits
Min	0.115	0.147	0.485	0.042	0.434	0.291
Q ₁	0.196	0.429	0.606	0.122	0.500	0.466
Median	0.268	0.500	0.672	0.156	0.564	0.550
Q ₃	0.300	0.600	0.745	0.209	0.639	0.659
Max	0.491	0.757	0.830	0.363	0.789	0.837

URTI = upper respiratory tract infection. LRTI = lower respiratory tract infection.

Analysis

Logistic regression analysis revealed that non-physician providers were significantly more likely to prescribe antibiotics than physicians. Providers in family medicine practices and non-teaching clinics were significantly more likely to prescribe antibiotics than those in internal medicine and teaching clinics, respectively.

Logistic regression model of Tier 3 prescribing rates			
	Odds ratio	p value	95% CI
Degree	8.2	<0.001	3.3 20.4
Specialty	3.8	0.019	1.2 11.5
Teaching	4.9	0.003	1.7 14.2

Degree = Non-physician provider (NP or PA) compared to physician provider (MD or DO)
Specialty = Family medicine compared to internal medicine
Teaching = Practices without trainees compared to practices with trainees

Conclusions

- There was considerable variability in outpatient antibiotic prescribing practices among providers in our large academic healthcare network.
- We found appreciable rates of antibiotic prescribing for diagnoses categorized as Tier 3, for which antibiotics are almost never indicated.
- Tier 3 prescribing was more common among non-physician practitioners, among those trained in family medicine, and in non-teaching settings.
- Possible explanations for these differences include differences in training and differences in patient population; for example, non-physician providers may be more likely to see acute visits.
- Investigation of additional factors, such as patient characteristics and patient volume, is warranted in order to further interpret these results.
- Understanding characteristics of clinicians that prescribe antibiotics for inappropriate conditions may help to target stewardship interventions.

References

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