Impact of a multifaceted, outpatient antimicrobial stewardship intervention bundle on unnecessary antimicrobial prescribing in upper respiratory tract infections (URI)

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ABSTRACT

BACKGROUND
URIs are the most common indication for outpatient antibiotic prescribing. Given high rates of unnecessary prescribing, these indications have been identified as a high priority target for outpatient antimicrobial stewardship programs (ASP). Our primary objective was to evaluate the impact of a system-wide, multifaceted, outpatient ASP intervention bundle on unnecessary antibiotic prescribing for URI.

METHODS
This quasi-experimental study was conducted from 2019 to 2021. ICD-10 codes for URIs were grouped into 3 tiers (i.e., tier I = antibiotics always indicated, tier II = sometimes, tier III = never). Encounters from 5 care specialties (i.e., family medicine, community internal medicine, express care, pediatrics, and emergency department) with a tier III URI primary ICD-10 code but without a secondary tier I or tier II code were included. COVID-19 ICD-10 codes were excluded. Interventions included construction of a prescribing data model, dissemination of clinician prescribing data and education, promotion of symptom management strategies, a patient-facing commitment poster, and a pre-populated URI order panel. Tools were designed at a system level and implemented by regional champions. The primary outcome was the rate of antibiotic prescribing, and the secondary outcome and counterbalance measure was the rate of repeat URI-related healthcare contact within 14 days. Outcomes were analyzed with chi-square with an α level of 0.05.

RESULTS
A total of 147,403 encounters were included. The overall antibiotic prescribing rate decreased from 24.1% to 12.3% from 2019 to 2021 (p<0.01). Significant reductions in tier III antibiotic prescribing were demonstrated for each region, care specialty, and syndrome evaluated. A reduction in repeat healthcare contact was seen across the total cohort (9.5% in 2019 vs. 8.3% in 2021, p<0.01); decreases in repeat contact rates were observed in those not initially receiving an antibiotic (10.3% vs. 8.6%, p<0.01), but not in those who initially received an antibiotic (6.8% vs. 6.8%, p = 0.94).

CONCLUSIONS
A multifaceted, outpatient ASP intervention bundle decreased rates of unnecessary antimicrobial prescribing without increasing rates of 14-day repeat URI-related healthcare contact.

BACKGROUND

- ~80-90% of human antimicrobial consumption occurs in the outpatient setting, with ~30% being unnecessary.[1]
- In 2020, 201.9 million antibiotic prescriptions were issued, yielding an estimated 60.6 million unnecessary prescriptions.[2]
- Respiratory tract infections are a leading indication for outpatient antimicrobial therapy.[3]
- Antibiotics are often prescribed in respiratory syndromes not bacterial in nature.[4]

METHODS

SETTING: Mayo Clinic Enterprise (Arizona, Florida, Mayo Midwest)

TIMEFRAME: January 1st, 2019 – December 31st, 2021

- Interventions implemented Q3 2020-Q1 2021

INCLUSION:

- Respiratory ICD-10 codes divided into 3 tiers:
  1. Tier I: Always prescribe (e.g., pneumonia)
  2. Tier II: Sometimes prescribe (e.g., otitis media)
  3. Tier III: Never prescribe (e.g., bronchitis)
- Visit-based family medicine, community-internal medicine, express care, pediatrics, or emergency medicine encounters for a tier III respiratory diagnosis

EXCLUSION:

- Tier I or II respiratory diagnosis also associated with the index encounter
- COVID-19 related primary diagnoses

STATISTICS: Chi-square with an α level of 0.05

INTERVENTIONS

- Data model development and dissemination of clinician prescribing data with education
- Promotion of symptom management strategies
- Patient facing antimicrobial commitment poster display
- URI treatment/diagnosis order panel implementation

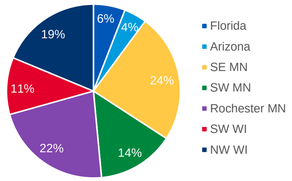
OUTCOMES

PRIMARY: Percent of visit-based encounters for tier III respiratory diagnoses resulting in an antimicrobial prescription

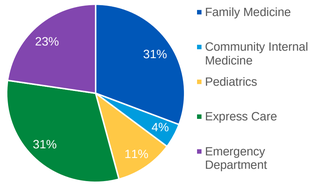
SECONDARY: Rate of 14-day repeat healthcare contact (i.e., repeat clinic, emergency, or hospital visit for any respiratory diagnosis)

STUDY POPULATION (N = 147,403)

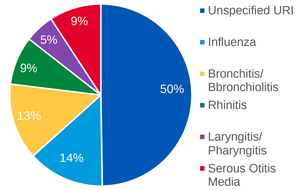
FIGURE 1



Total encounters by region



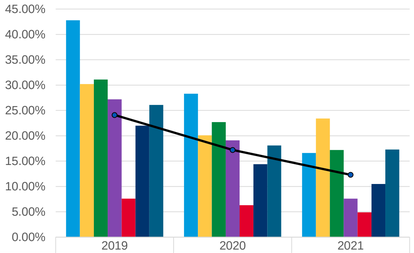
Total encounters by care specialty



Total encounters by syndrome

RESULTS – PRIMARY OUTCOME

FIGURE 2



	2019	2020	2021
FL	42.80%	28.30%	16.60%
AZ	30.20%	20.10%	23.40%
SE MN	31.10%	22.70%	17.20%
SW MN	27.20%	19.10%	7.60%
Rochester MN	7.60%	6.30%	4.90%
SW WI	22.00%	14.40%	10.50%
NW WI	26.10%	18.10%	17.30%
Enterprise	24.10%	17.20%	12.30%

Enterprise and regional rates of respiratory antimicrobial prescribing in tier III URI encounters (all regions demonstrate a statistically significant difference (p<0.05) across study period)

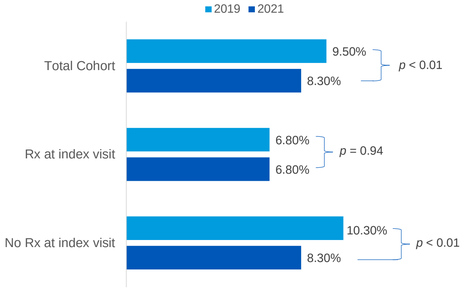
TABLE 1

		2019	2020	2021
Care Specialty	Family Medicine	29.7%	19.6%	13.8%
	Community Internal Medicine	27.2%	15.4%	14.5%
	Pediatrics	10.6%	12.3%	7.5%
	Express Care	26.6%	20.9%	15.2%
	Emergency Department	17.4%	11.7%	9.6%
Syndrome	Unspecified URI	15.3%	11.3%	6.5%
	Influenza	5.0%	4.3%	3.1%
	Bronchitis/ Bronchiolitis	60.9%	56.1%	38.6%
	Rhinitis	4.5%	3.2%	3.1%
	Laryngitis/ Pharyngitis	5.6%	5.4%	2.3%
	Serous Otitis Media	54.7%	51.9%	41.5%

Enterprise antimicrobial prescribing rates for tier III URI encounters by specialty and syndrome (all values demonstrate a statistically significant difference at p<0.05 across study period)

RESULTS – SECONDARY OUTCOME

FIGURE 3



Enterprise repeat URI-related healthcare contact within 14 days following a tier III URI encounter

CONCLUSIONS

Enterprise-wide implementation of a multifaceted, outpatient antimicrobial stewardship URI intervention produced:

- ☑ Decreased rates of unnecessary antimicrobial prescribing in tier III URIs
- ☑ No compensatory increase in repeat healthcare contact for respiratory syndromes

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