phenotypes of outpatient antibiotic prescribing practices using an unsupervised machine learning clustering algorithm.

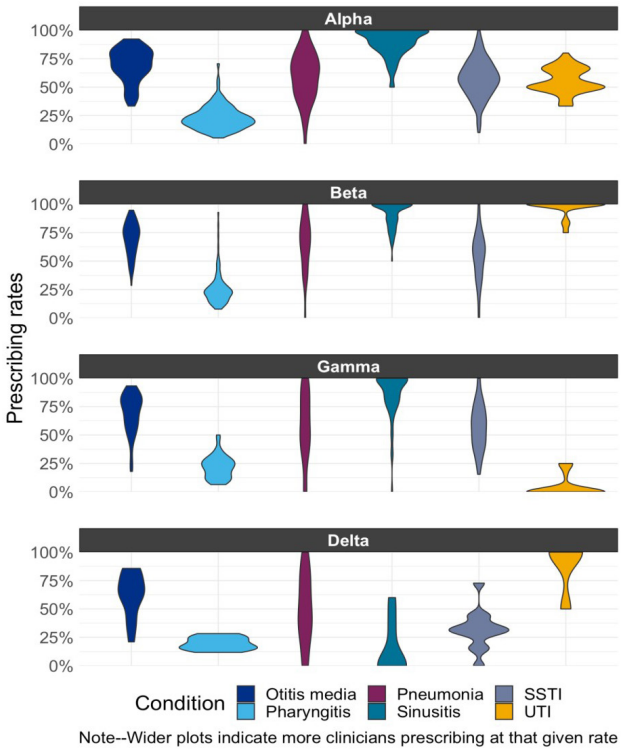
Methods: We extracted diagnoses and prescribing data on all problem-focused visits with a physician or nurse practitioner between 6/11/2018 – 12/11/2018 for a state-wide association of pediatric practices across Massachusetts. Clinicians with fewer than 100 encounters were excluded. The proportion of encounters resulting in an antibiotic prescription were calculated. Proportions were stratified by diagnoses: otitis media (OM), pharyngitis, pneumonia (PNA), sinusitis, skin & soft tissue infection (SSTI), and urinary tract infection (UTI). We then applied consensus *k*-means clustering, a form of unsupervised machine learning, across all included clinicians to create clusters (or phenotypes) based on their prescribing rates for these 6 conditions. A scree plot was used to determine the optimal number of clusters.

Results: A total of 431 clinicians at 77 practices with 234,288 problem-focused visits were included (Table 1). Overall, 42,441 visits (18%) resulted in an antibiotic prescription. Individual clinician prescribing proportions ranged from 5% of visits up to 44%. The optimal number of clusters was determined to be four (designated *alpha*, *beta*, *gamma*, *delta*). Antibiotic prescribing rates were similar for each phenotype across AOM, pharyngitis, and pneumonia but differed substantially for sinusitis, SSTI, and UTI (Figure 1). The *beta* phenotype had the highest median rates of prescribing across all conditions while the *delta* phenotype had the lowest median prescribing rates except for UTI.

Table 1. Patient demographics and clinician characteristics

Characteristics	
Patient Demographic	**(n = 234,288)**
Age, median (IQR), y	6.8 (2.0-11.6)
Females, No. (%)	114,801 (49)
Insurance type, No. (%)	
Private	161,659(69)
Public	72,629 (31)
Complex chronic condition, No. (%)	24,600 (10.5)
Clinician Characteristics	**(n = 431)**
Age, median (IQR), y	49 (31-67)
Females, No. (%)	321 (74)
Clinician Type, No. (%)	
Physician (MD/DO)	333 (77)
Nurse Practitioner	93 (22)
Physician Assistant	5 (1.2)

Figure 1. Novel phenotypes of antibiotic prescribing practices across six common conditions



Note--Wider plots indicate more clinicians prescribing at that given rate

Conclusion: Antibiotic prescribing varies by both condition and individual clinician. Clustering algorithms can be used to derive phenotypic antibiotic prescribing practices. Antimicrobial stewardship efforts may have a higher impact if tailored by antibiotic prescribing phenotype.

Disclosures: **All Authors**: No reported disclosures

135. Designing And Evaluating A Pharmacist-Driven Approach to Outpatient Azithromycin Stewardship

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Session: P-5. Antimicrobial Stewardship: Non-Inpatient Settings

Background: After collecting data on diminishing *S. pneumoniae* susceptibility rates, the Madison VA aimed to optimize azithromycin prescribing practices by enhancing the involvement of outpatient pharmacists. This study aimed to develop effective pharmacy-led stewardship teams in the outpatient setting and assess their collective impact on promoting judicious azithromycin prescribing.

Methods: Madison VA outpatient pharmacists initiated an azithromycin stewardship protocol in 4/2019 to intervene on prescriptions suspected to be discordant with expert guidelines for COPD, pneumonia, sinusitis, or bronchitis. After pharmacist follow-up with providers to discuss potentially inappropriate prescriptions, recommendations and outcomes were subsequently documented in the electronic health record. Given the longitudinal nature of outpatient pharmacist interventions, a post-hoc survey was provided to assess pharmacists' perceptions of this protocol, barriers to intervention, and areas for improvement.

Results: Between 10/2018 and 4/2020, 18 pharmacists intervened on 42 outpatient azithromycin prescriptions to recommend alternative antibiotics with improved streptococcal coverage or supportive care alone. Indications warranting the most intervention included COPD exacerbations, upper respiratory infections, and bronchitis. Factors most often cited by pharmacists as barriers to intervention included negative impact on workload, provider reluctance, and insufficient time for follow-up. All surveyed pharmacists believed that prescribers, most commonly primary care providers, were fairly or very receptive to their recommendations. Data evaluated from 10/2018 to 12/2019 revealed a 45% decrease in azithromycin prescribing.

Conclusion: Azithromycin prescribing has steadily declined at the Madison VA, reinforced by the implementation of an outpatient pharmacist stewardship team. To more seamlessly integrate recommendation-making into pharmacist workflow, determining solutions to identified barriers is currently underway. It is hoped that continued pharmacist involvement in outpatient antibiotic stewardship can be a sustainable practice and transferrable strategy to other antimicrobial agents in the future.

Disclosures: **All Authors**: No reported disclosures

136. Don't Sweat the Small Stuff: Solutions for Large-Scale Stewardship Obstacles

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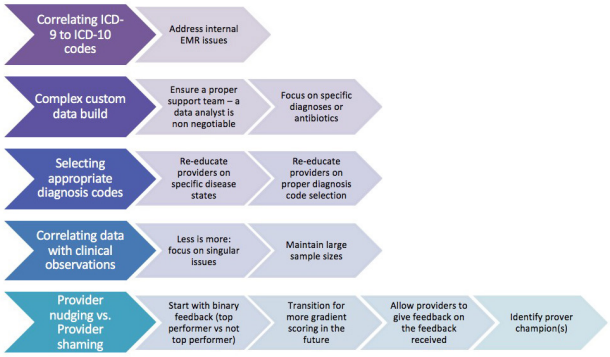
Session: P-5. Antimicrobial Stewardship: Non-Inpatient Settings

Background: In an effort to support stewardship endeavors, the MITIGATE (a Multifaceted Intervention to Improve Prescribing for Acute Respiratory Infection for Adult and Children in Emergency Department and Urgent Care Settings) Toolkit was published in 2018, aiming to reduce unnecessary antibiotics for viral respiratory tract infections (RTIs). At the University of Washington, we have incorporated strategies from this toolkit at our urgent care clinics. This study aims to address solutions to some of the challenges we experienced.

Challenges and Solutions



Methods: This was a retrospective observational study conducted at Valley Medical Center (Sept 2019-Mar 2020) and the University of Washington (Jan 2019-Feb 2020) urgent care clinics. Patients were identified through ICD-10 diagnosis codes

included in the MITIGATE toolkit. The primary outcome was identifying challenges and solutions developed during this process.

Results: We encountered five challenges during our roll-out of MITIGATE. First, using both ICD-9 and ICD-10 codes can lead to inaccurate data collection. Second, technical support for coding a complex data set is essential and should be accounted for prior to beginning stewardship interventions of this scale. Third, unintentional incorrect diagnosis selection was common and may require reeducation of prescribers on proper selection. Fourth, focusing on singular issues rather than multiple outcomes is more feasible and can offer several opportunities for stewardship interventions. Lastly, changing prescribing behavior can cause unintended tension during implementation. Modifying benchmarks measured, allowing for bi-directional feedback, and identifying provider champions can help maintain open communication.

Conclusion: Resources such as the MITIGATE toolkit are helpful to implement standardized data driven stewardship interventions. We have experienced some challenges including a complex data build, errors with diagnostic coding, providing constructive feedback while maintaining positive stewardship relationships, and choosing feasible outcomes to measure. We present solutions to these challenges with the aim to provide guidance to those who are considering using this toolkit for outpatient stewardship interventions.

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137. Evaluating a Novel Antibiogram Format for use in Wisconsin Nursing Homes

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Session: P-5. Antimicrobial Stewardship: Non-Inpatient Settings

Background: Nursing homes (NHs) increasingly use antibiograms to track antibiotic-related outcomes and guide antibiotic choice. Creation of a facility-specific antibiogram is hampered by low number of cultures collected in NHs. A weighted-incidence syndromic combination antibiogram (WISCA) is an alternative approach that may provide more stable estimates of antibiotic activity. In this study, we compare traditional antibiograms and WISCAs in a sample of Wisconsin NHs.

Methods: We created urine-specific antibiograms using traditional and WISCA approaches at facility and regional levels using culture data collected in study NHs from 01/01/2018 – 12/31/2018. Susceptibility results were standardized across laboratories using CLSI breakpoints. Traditional antibiograms were deemed reliable when ≥ 20 isolates were recovered for at least one species and species exceeding this threshold comprised 75% of all isolates. WISCAs were deemed reliable if ≥ 20 urinary isolates were recovered. Bootstrapped regional mean susceptibilities and confidence intervals for traditional antibiograms and WISCAs were calculated. Susceptibilities calculated at the facility-level were compared to regional estimates. Facility-level susceptibility estimates were deemed concordant if within 1 SD, moderately discordant if between 1 and 2 SDs, and severely discordant if greater than 2 SDs of the regional estimate.

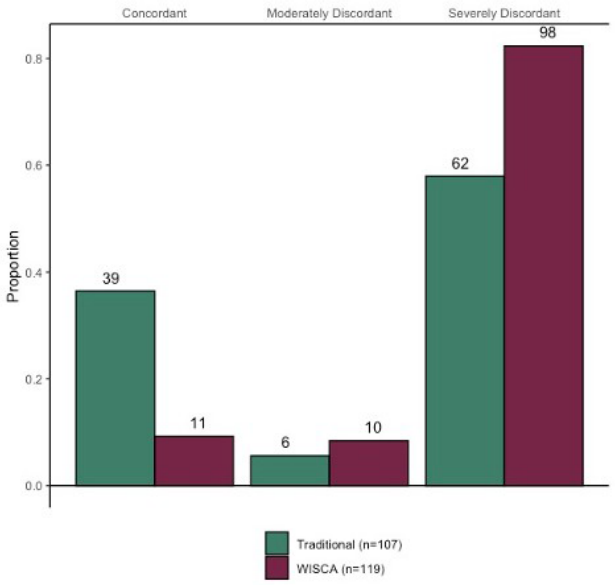
Results: 462 urine isolates were obtained from 23 NHs in 2 regions. None of the facility-specific traditional antibiograms met reliability criteria. 10 of 23 facility-specific WISCAs were reliable and increased to 19 of 23 when 2-years of microbiology data were utilized (table). Severe discordance between facility-specific and regional estimates was identified with 62/107 NH species-antibiotic means and 98/119 NH urine isolate-antibiotic means falling outside of 2 SD of corresponding bootstrap regional susceptibility means (figure).

Table. Reliability analysis of facility-specific urinary WISCAs and traditional antibiograms. 2-year projection was created using the assumption of similar culture results over 2-years.

NH-specific tools

	1-year			2-year projection
	Mean number of isolates per NH	>20 isolates, No. (%)	>30 isolates, No. (%)	>20 isolates, No. (%)
Urinary WISCA				
Isolates	20	10 (43)	4 (17)	19 (83)
Traditional antibiogram				
Escherichia coli	7.2	0	0	7 (30)
Proteus spp	3.1	0	0	0
Enterococcus spp.	3.1	0	0	0
Klebsiella spp.	2.8	0	0	0

Figure. Proportion of concordant, moderately discordant, and severely discordant NH mean susceptibilities in comparison to bootstrap regional mean susceptibilities for traditional antibiograms and WISCAs. NH mean susceptibilities from 5 isolates of more were included.



Conclusion: WISCAs are more reliable than traditional antibiograms for estimating antibiotic susceptibilities using facility-specific data. The high degree of discordance observed between facility-specific and regional antibiograms raises concerns about pooling culture data from multiple facilities.

Disclosures: **All Authors**: No reported disclosures

138. Focused Outpatient Antibiograms: Time for Widespread Implementation?

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Session: P-5. Antimicrobial Stewardship: Non-Inpatient Settings

Background: Significant antimicrobial use occurs in outpatient settings, making this an important area for expanding stewardship. Data show over 260 million annual prescriptions in the U.S. Family practitioners prescribed the most antibiotic courses (24%)[1]. Urinary Tract Infections (UTI) comprise one of the most common indications for antibiotics. In this study, antibiogram data were compiled for urinary isolates of *E coli* collected from all outpatients as well as Family Medicine-specific (FM) clinics in an academic medical center in Eastern NC. The objective is to identify susceptibility variations for *E. coli* from urine isolates specific to combined outpatient and academic FM clinics compared to composite non-intensive care unit (ICU) data. Also, assess impact of providers' knowledge/access to a focused antibiogram on choice of empiric therapy.

Methods: Data were electronically obtained from the microbiology laboratory at Vidant Health (VH), a large regional system serving over 1.4 million people from 29 counties in Eastern NC. All urine cultures with *E. coli* from 9/2018 - 9/2019 were included. Two focused antibiograms were then developed via MedMind.

A pre and post intervention survey was conducted with FM practitioners, including residents. Intervention was defined as a brief talk to educate providers about variations identified via focused antibiograms. Survey results were compared to assess for intent to change practice.

Results: Pre-survey data are noted in Figure 1. Post-survey changes are described in Figure 2 noting that 100% of respondents now felt a need to have access to focused antibiogram data.

There were 1107 *E coli* urinary isolates for all outpatients and 104 for FM clinics only. Figure 3 highlights key differences in antibiogram data, especially enhanced susceptibilities for common antibiotics in FM-specific clinics when compared to composite institutional data.