How can we reimagine antibiogram data? Interactive Antibiogram Decision Support Tool Predicated Upon Infection Site and Probable Pathogens

Background

Current methods for displaying summary antibiograms are static, have limited utility and are not user friendly.



Methods

Antibiotic susceptibility data for first, nonduplicate patient infection isolates with source/site data were collected from 2009–2018 at an integrated health system for the visualizations.



Iterative user-centered design sessions were held with healthcare providers to guide prototype development, including assessment of source groupings and rational for aggregating data. Three providers participated in initial and follow-up sessions (6 total) with study personnel. Data were aggregated by agreed-upon infectionsource and pathogen; antibiotic results with <30 isolates were excluded.



Results The multi-year dataset included: • 119,333 non-duplicative isolates from 194 unique infection sites • Nearly half were E. coli (n=50,404).		The large dataset collected supports source-specific susceptibility results (e.g. eye infections).			
Figure 1. Visualization of	urine isolates, <i>E</i>	. coli and use	r selected anti	ibiotics.	
Interactive Antimicro Select potential pathogens and antibiot Source:		ance Visua	lization		
URINE SKIN/SOFT-TISSUE BLOOD	RESPIRATORY SECRETIONS	FLUID EAR BOI	NE VAGINAL/PERIANAI	L EYE ABSC	ESS
Antibiotics:		Pathogens:			
ampicillin, trimethoprim/sulfametho	oxazole, -	Escherichia coli	•		
Antibiotic Classes Quinolones, Beta-lactams/penicillin	Antibiotic Classes Quinolones, Beta-lactams/penicillins, Trim				
			Dodged Layout		
	At least 90% of Pathoge (Hover over bar for addit		otible to Antibiotic Treatment	no 📕 yes	Ŧ
		Escherichi	ia coli		
nitrofurantoin			8	d% 9d%	
ciprofloxacin Vipiotic trimethoprim/sulfamethoxazole					
trimethoprim/sulfamethoxazole		Antibiotic: trimethopi Class: Trimethoprim	rim/sulfamethoxazole s		
ampicillin		Samples: 48359 Percent: 86.98 Class Percent: 86.98	3		
	0 25	50 Percent Susce	75 ptible (%)		100
Final source groupings: Urine, Skin/Soft T		Percent Susce	ptible (%)		

First an infection source is selected; the visualization then shows pathogen prevalence in descending order. Providers can view susceptibility results for all antibiotics or deselect all and view only those under consideration, such as the four displayed in Figure 1. Resulting bar charts allow providers to view which pathogens tested have greater than 80% or 90% susceptibility to each antibiotic.

Wisconsin-Madison Madison of Wisconsin-Madison Wisconsin-Madison

Contact: Laurel Legenza Legenza@wisc.edu

Antibiotics Antibiotic Classes Pathogens: Gram Stain Test Gram-negative Gram-positive Dodged Layout

Laurel Legenza, PharmD, MS – School of Pharmacy, University of

Jared Zunenshine, MS – School of Pharmacy, University of Wisconsin-

Nasia Safdar, MD, PhD – School of Medicine and Public Health, University

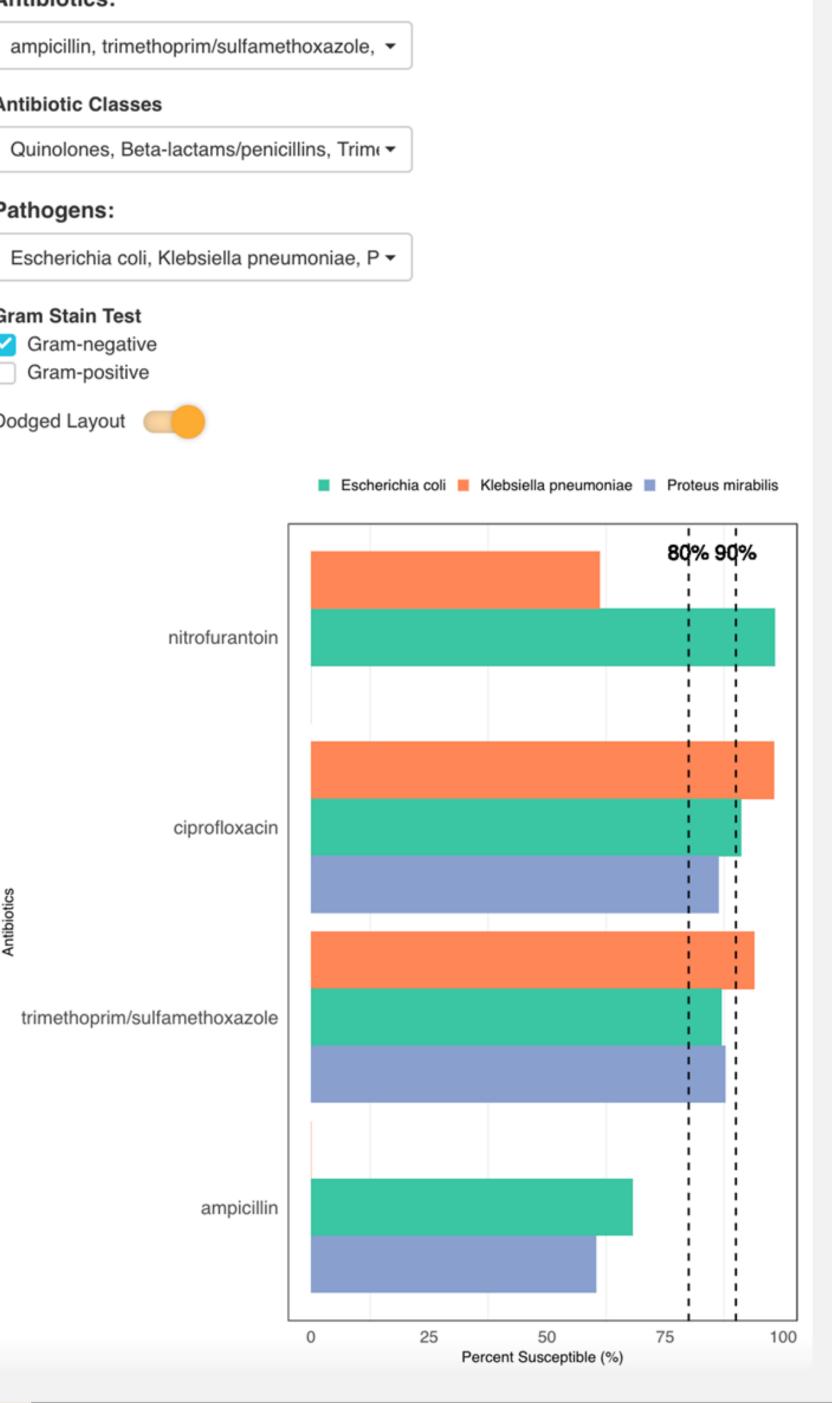
Colin Guest, MS Biomedical Engineering, University of Wisconsin-Madison Harshvardhan Jadhav, MS - Industrial Engineering, University of

Thomas R. Fritsche, MD, PhD – Marshfield Clinic Health System John D. Lee, PhD – Department of Industrial and Systems Engineering, College of Engineering, University of Wisconsin-Madison



Marshfield Clinic Research Institute

Figure 2. Selected antibiotic susceptibilities for multiple pathogens can be visualized simultaneously with the dodged feature.



Conclusion

Our interactive antibiogram data clinical decision support tool extends the utility of the traditional lab-generated antibiogram. Importantly, future iterations will include visualizing changes by year, by clinical setting (inpatient vs. outpatient) and an assessment of uptake of this tool in the clinical setting.