Practical considerations when creating a weighted incidence syndromic combination antibiogram (WISCA)

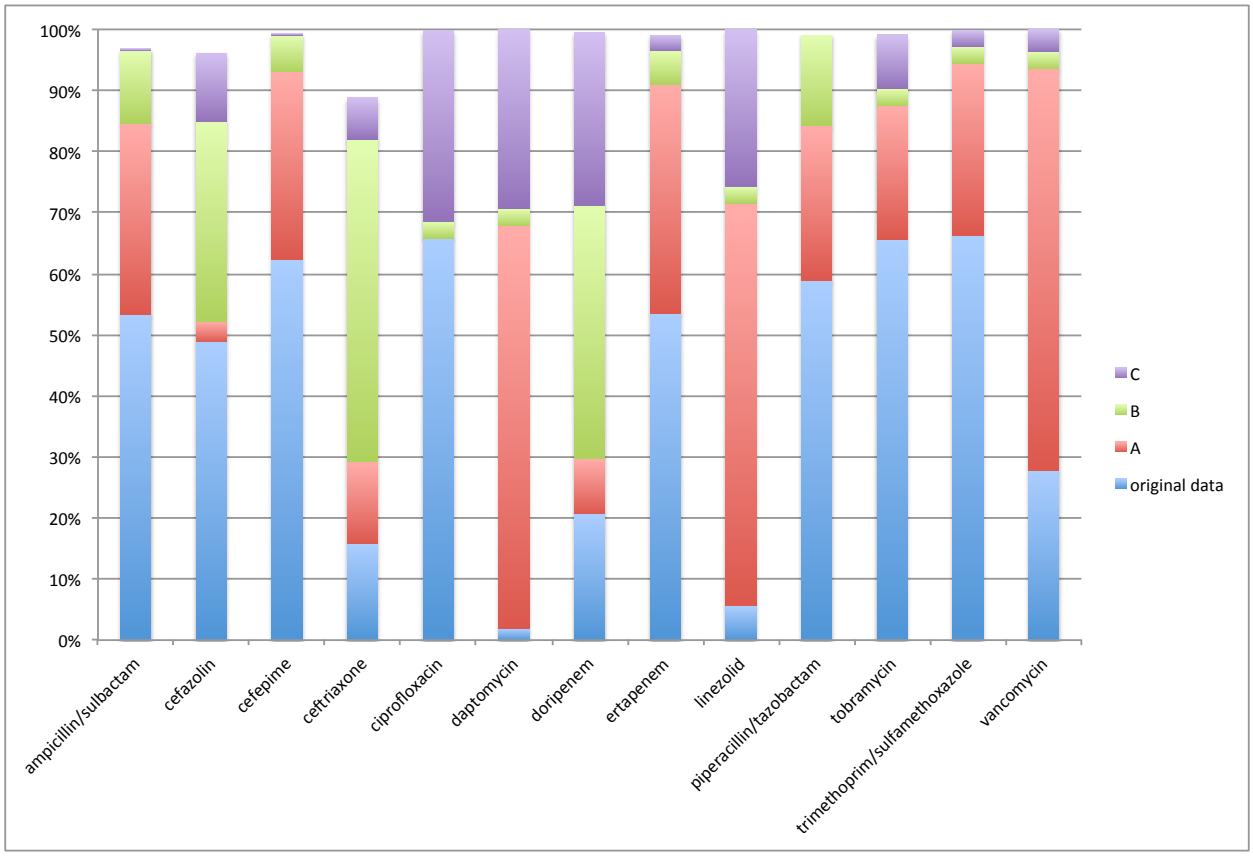
Authors:

Background:
The WISCA[1], a novel antibiogram, displays the percent coverage of each antibiotic by syndrome, rather than by organism. To create a WISCA, antibiotic susceptibilities for each organism must be known for all antibiotics, even ones that are not routinely tested in the lab. Therefore, we employ experts to fill in the un-observed susceptibility data. We discuss the process of enriching the microbiology dataset with expert knowledge, the number and types of assumptions made and how these assumptions may impact the eventual WISCA development

Methods:
All data were collected from the information warehouse at The Ohio State University. Five years of microbiology records for patients admitted to the hospital with a diagnosis of UTI and a positive urine culture in the first 48 hours of admission were included. All culture results that grew: yeast, an unspeciated organism or organisms unlikely to be true pathogens (as determined by experts) were excluded from the cohort.. Five subject matter experts developed rules for enriching the dataset when susceptibility information was un-observed. For example, *"No gram-negative organisms are covered by vancomycin."* Rules were classified as **A:** intrinsic to the drug/organism combination (e.g. vancomycin/*E.coli*) **B:** High confidence **C:** Less than high confidence/requires judgment. The percentage of rules that fell into each category and the percentage of missing data filled in by each type of rule for each antibiotic were summarized.

Results:
After exclusions, 7,981 organisms and 5,325 patients and 6,696 encounters remained. We chose 13 antibiotics of interest.. Of a total of 103,753 (13 x 7981) cells in the dataset, 59,901 (58%) did not have susceptibility data. 44 rules were created to *enrich* these cells. 1,813 (1.7%) cells could not be filled in because no rule has yet been agreed upon. The impact of each of each type of rule on each included antibiotic can be seen in Figure 1.

Conclusions:
Our results suggest that the majority of the susceptibility data for each antibiotic is either already known, or filled in with a high degree of confidence. Future work will focus on better understanding the impact of these decisions on the final WISCA.



Mock Figure 1

References

1. Hebert C, Ridgway J, Vekhter B, Brown EC, Weber SG, Robicsek A. Demonstration of the weighted-incidence syndromic combination antibiogram: an empiric prescribing decision aid. *Infection control and hospital epidemiology.* 2012;33(4):381-388.