Kentucky Antimicrobial Stewardship Innovation Consortium

Educational Pearl

Build an Antibiogram

The previous KASIC pearl, How to Use an Antibiogram, outlined the uses of a local institutional antibiogram, however the creation of an antibiogram often requires multidisciplinary collaboration. The Clinical and Laboratory Standards Institute (CLSI) provides standards on how to create an antibiogram. Antibiograms are great tools for every antimicrobial stewardship program. For a more detailed review of antibiograms, check out our free video on Antibiograms: Creating Them / Using Them.

CLSI Reference Documents

- M39 Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data[1]
  - M39 provides instructions on how to build an antibiogram
  - The most up to date document is not available for free
- M100 Performance Standards for Antimicrobial Susceptibility Testing[2]
  - M100 provides breakpoints for various bug/drug combinations
  - To access M100 from the above hyperlink "Click here to use guest access", then select "CLSI M100"

Key Points for Building Antibiograms

- Compile an antibiogram on at least an annual basis (i.e. updating each a calendar year)
- Include only the first isolate per patient in the period analyzed. Do not include isolates that regrew even if it came from a different culture source (i.e. *E coli* growing from both blood and urine cultures only count once)
- Include different organisms from the same patient. For example, an *E. coli* from a urine culture and a *S. aureus* from a wound culture from the same patient will both be included.
- Recommend only reporting organisms that have a minimum of 30 isolates collected over the year

Overview of Calculating Antibiogram Susceptibility Rates

The first step is to aggregate minimum inhibitory concentration (MIC) data by organism and drug (See "What is an MIC" Pearl). Table 1 is an example of ceftriaxone MIC distribution for *E. coli*. Per CLSI M100, an MIC of ≤ 1 µg/mL classifies the isolate as susceptible. The susceptibility rate can be calculated as shown in Table 2. This rate is what is presented in an antibiogram. This process is repeated for every bug and drug combination.

Organism	Total Number of Isolates	Ceftriaxone MIC		
		≤ 1 µg/mL	2 µg/mL	≥ 4 µg/mL
E. coli	200	174	10	16

Table 1. MIC Values for Institutional E. coli

Organism	Number of Isolates	% Susceptibility
E. coli	200	(174/200) x 100 = 87%

Table 2. E. coli - Ceftriaxone Susceptibility Rate

Key Takeaway: Antibiograms are created in collaboration with the microbiology lab using standardized rules to report susceptibility rates of antibiotics by organism.

References:

1. Clinical and Laboratory Standards Institute. Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data M39. Pittsburgh, PA: CLSI; 2022.
2. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing, 32nd edition, CLSI supplement M100. Pittsburgh, PA: CLSI; 2022.

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