

Assignment 1: Visualization Design of Antibiotics data

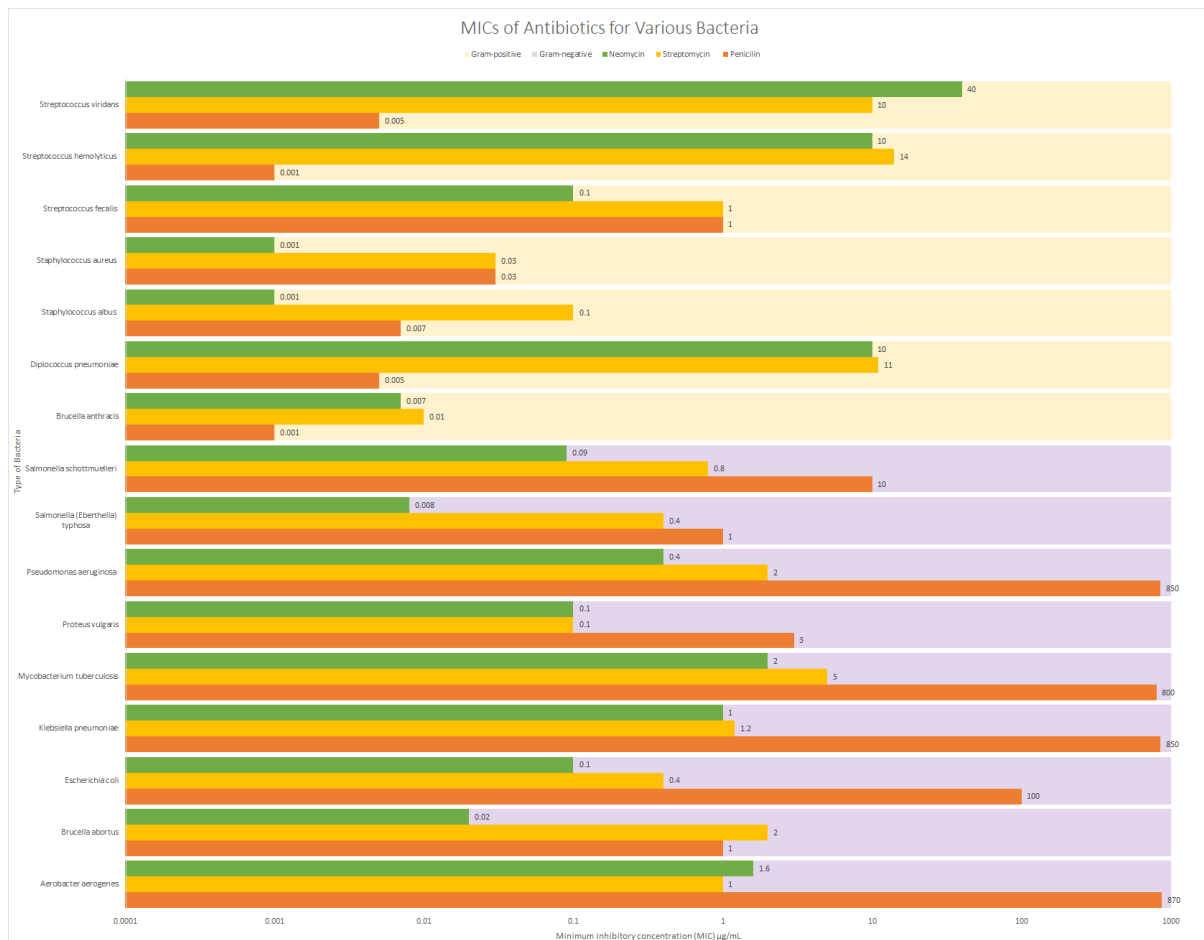


Figure 1. This figure shows the minimum inhibitory concentration (MIC) values of three antibiotics and 16 types of bacteria. The bacteria types are grouped by their reactions to Gram staining. This is the original graph, before discussion feedback.

The MIC is the lowest concentration of an antibiotic that inhibits the growth. This is used as a measure of effectiveness of the antibiotic and can be used to determine the appropriate choice of antibiotic to fight and infection. Gram staining is a method of stating bacteria with dye. Gram-positive bacteria can retain the color of the crystal violet stain. Gram-negative bacteria does not become stained. The data provided gives MICs of three of the most popular antibiotics (Penicillin, Streptomycin, Neomycin) on 16 different strains of bacteria and the reaction of each type of bacteria to Gram staining.

Category	Type	Encoding
Type of bacteria	Nominal	Label/ Y-Position
Type of antibiotic	Nominal	Color
Minimum inhibitory concentration (MIC)	Quantitative	Label/ X-Length
Gram staining (negative/ positive)	Nominal	Label/ Position

The bar graph allows for the viewer to visually compare the MICs of each of the antibiotics across various strains of the bacteria. The MIC is indicated by the x-length of the bar corresponding to a type of bacteria and antibiotic. A logarithmic scale was used for the x-axis, due to the large range of MIC values. Using a linear scale, would make it difficult to compare to the smaller values in the presence of much larger MIC values. To clarify the true MIC values, labels were used to supplement the visual component. The types of bacteria were categorized by gram staining. The

negative gram staining bacteria strains were put on the left side of the graph and colored with a purple background. The positive gram staining bacteria strains were put on the right side of the graph and colored with a yellow background. Coloring the background was done to make the gram staining unobtrusive to the MIC colors. The type of bacteria is labeled along the y-axis and is indicated by position. The three types of antibiotics are indicated by color.

There are some characteristics about MICs that the graph and the data set omit. First, MIC is a range of large variations. Additionally, an antibiotic with a high MIC can still be effective if it is delivered right to the site of infection. Another important attribute of effectiveness not considered here is the kill characteristics of the antibiotic, that is concentration vs time dependent killing. Other factors such as safety and cost of the antibiotic are also important in selecting the proper antibiotic. Lower MIC values (shorter bars) are better. However, this might be confusing to the reader, as it can be mistaken that the longer bars mean more effectiveness, rather than the other way around.

This graph was made in Excel using a bar graph type chart.

After in Class feedback:

The main point of confusion was the use of color to represent gram staining status and type of antibiotic. It was suggested that I use y-axis labeling to denote gram staining status instead. I had already grouped the bacteria (position-wise) by gram-status, so I removed the color and replaced it with labels and used a denote the two sections based on gram-status. Additionally, my graph did not suggest much about the interpretation of the MICs. Therefore, I decided to flip the x-axis (from going from the minimum value to maximum value to going from the maximum value to the minimum value), so that the longer bars indicated smaller MICs. Therefore, the length of the bar would be a signal of antibiotic effectiveness. In the original graph, the length of the bar and the x-axis position represented MIC. In the revised graph, the length of the bar is used to represent antibiotic effectiveness and the x-axis position is used to represent the MIC value. (In Excel, flipping the axis was done by setting the maximum of the axis as where the vertical axis crossed and then checking the box for flipping the values in reverse order). I also changed the title of the graph from “MICs of Antibiotics for Various Bacteria” to “Antibiotic Effectiveness for Various Types of Bacteria” to represent this change. Below is a revised version of the graph.

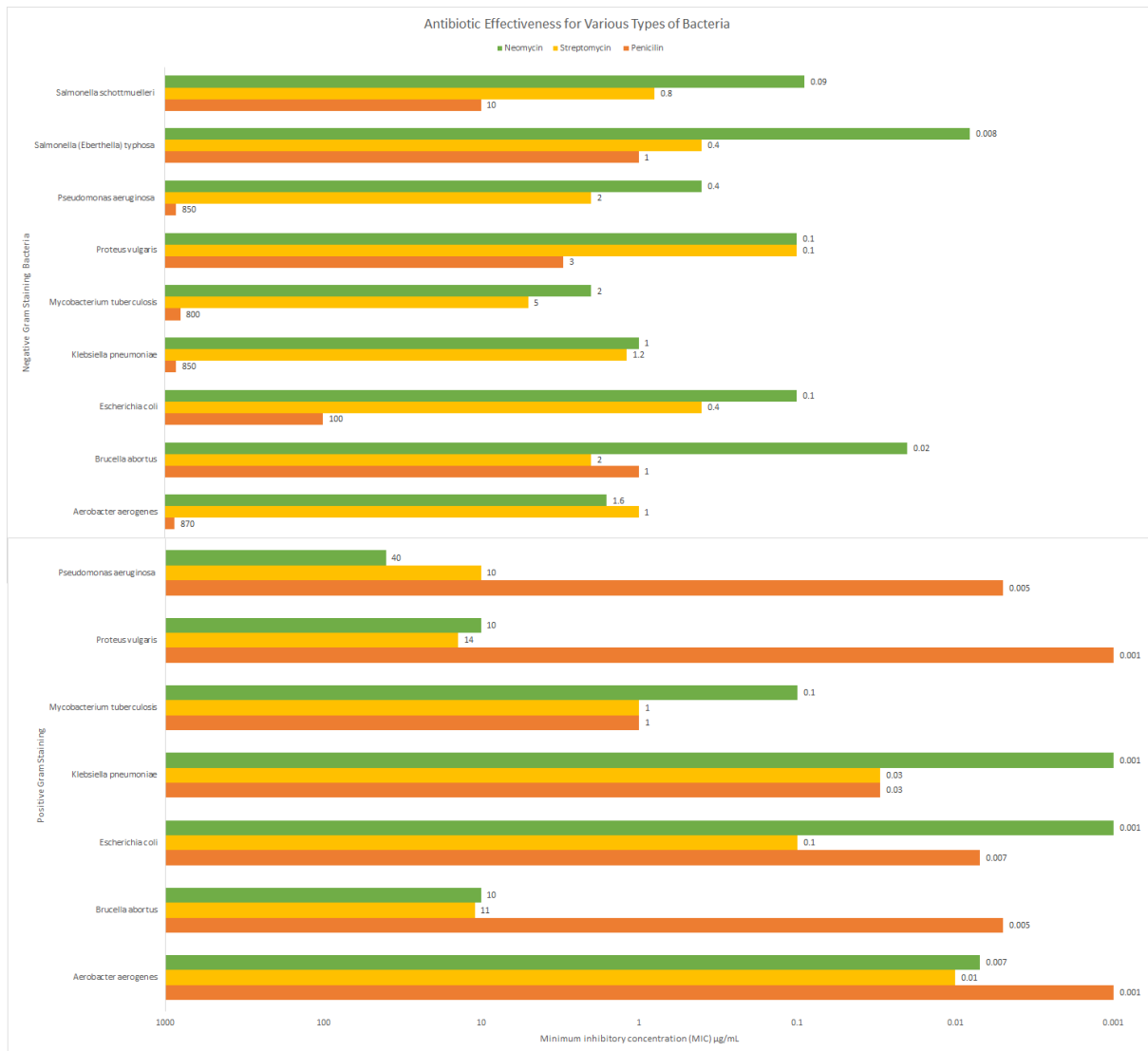


Figure 2. This figure shows the minimum inhibitory concentration (MIC) values of three antibiotics and 16 types of bacteria. The bacteria types are grouped by their reactions to Gram staining. This is the revised graph, after discussion feedback.

References

Nickson, C., & Chris. (2019, April 05). Minimum Inhibitory Concentration • LITFL • CCC Infectious disease. Retrieved from <https://litfl.com/minimum-inhibitory-concentration/>