ARE YOU SAFE?
Bacterial Species That Populate the Heart of Med City

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Background

- Rochester, Minnesota is a medical industry hub.
- In Rochester it is not uncommon to see individuals with medical and scientific backgrounds entering public facilities while wearing medical coats and scrubs.
- These items are worn to prevent unwanted contamination and are known to harbor pathogens.

Hypothesis:

We hypothesize that pathogenic bacteria will be more commonly found on public surfaces in close proximity to a hospital.

Bacterial Samples

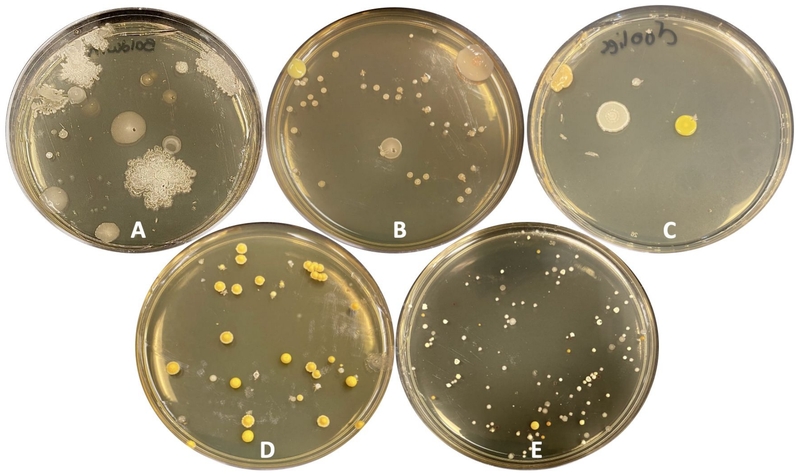

Figure 1. Samples taken from varying locations were streaked on trypticase soy agar (TSA) and incubated at 37°C. Plate A was collected within a hospital, plate C was collected three blocks away from a hospital, and plates B, D, E were collected at least one mile away from a hospital.

Taxonomic Relationships of Isolates

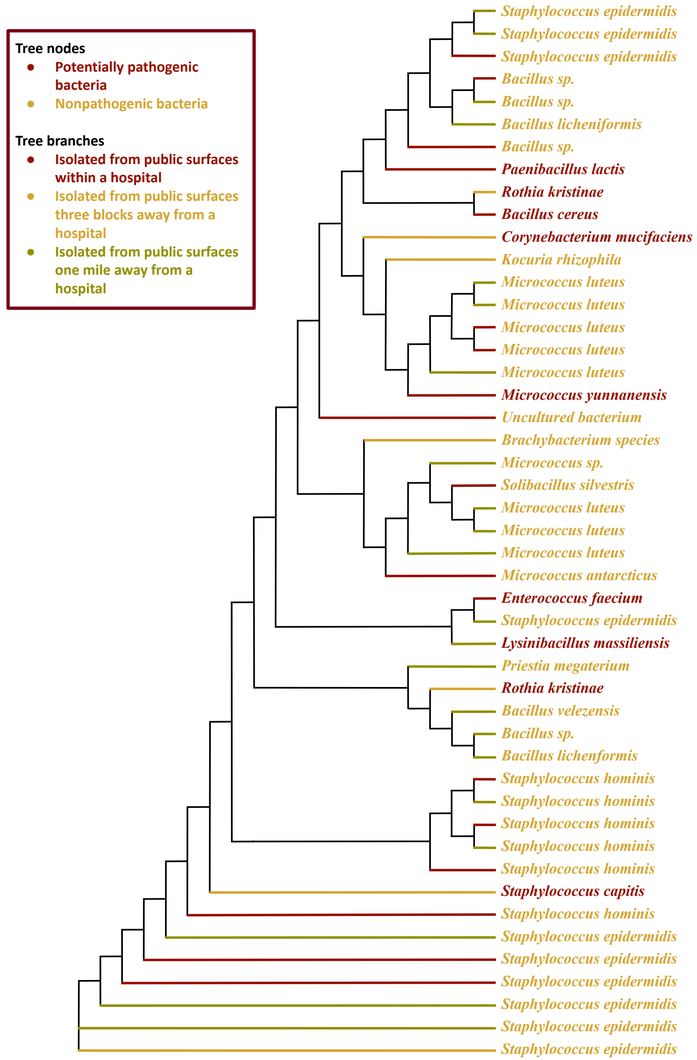

Figure 2. Dendrogram of bacterial isolates collected from public surfaces. 16S sequences were visually inspected and automatically aligned using Molecular Evolutionary Genetic Analysis (MEGAX). MUltiple Sequence Comparison by Log-Expectation (MUSCLE) using diagonal optimization with 2 iterations was used to create the dendrogram.

Pathogenic Potential by Location

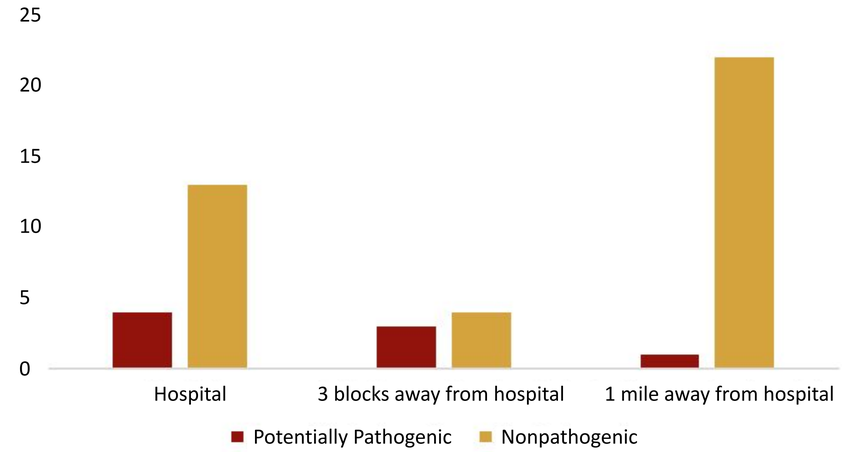

Figure 3. Bar Chart numerically depicting potentially pathogenic and non-pathogenic bacteria isolated from within a hospital as well as 3-blocks and 1-mile away from a hospital. Y-axis indicates number of bacterial species. The chi-square test statistic is 6.4335 and the p-value is 0.040086.

Discussion

- We developed a successful 16S PCR amplification and sequencing protocol; DNA sequencing of this gene is routinely used for clinical and environmental bacterial identification.
- While meaningful results were obtained from most all bacterial samples selected from TSA plates, a potential limitation may include inadvertently excluding species that require alternative metabolic resources.
- Samples were collected temporally three times (Oct., Nov., Feb.) at three locations from each distance. Increasing sample size, in the future, will contribute to increased confidence in our results.

Conclusion:

There exists a relationship between exposure to pathogenic bacteria on public surfaces and proximity to a hospital (Fig. 3).