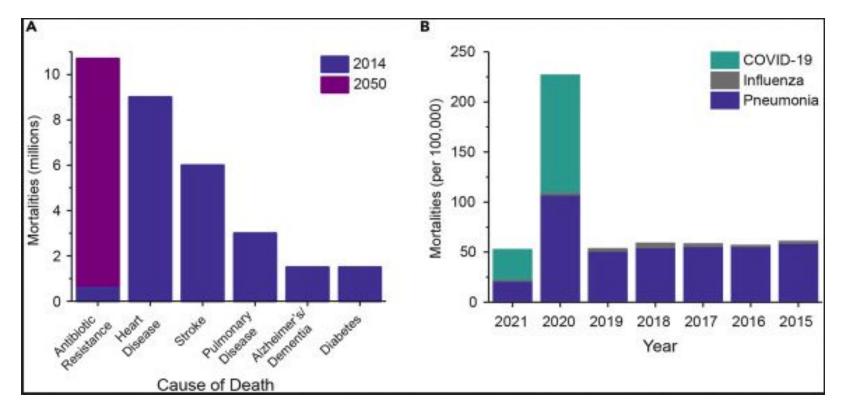
Bacteriophages Close to Home

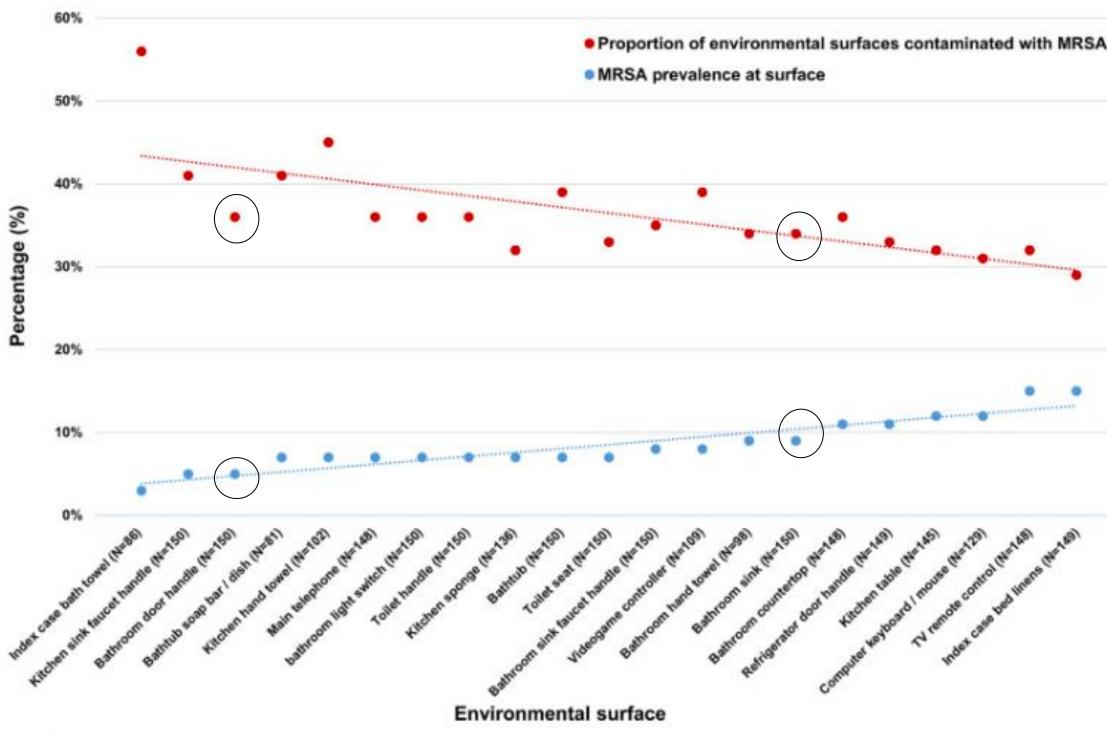
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INTRODUCTION

- Staphylococcus Aureus is responsible for at least 20,000 deaths each year in the United States according to the CDC. MRSA is a methicillin-resistant S. aureus that can cause a staph infection that is resistant to multiple antibiotics, one being penicillin.
- Antimicrobial resistance in bacteria reduces the overall effectiveness of current treatments for microbial infections such as *S. aureus* infections. *S. aureus* is a bacteria that is found on parts of the human body such as our skin and nose. As seen by the data below, antibiotic resistance is projected to be the highest cause of death globally by 2050.



- S.aureus is commonly transmitted via skin-to-skin contact, so we reasoned that similar environments can also contain phages that can infect S. aureus. We sampled high-touch areas around the house in order to determine to what extent phages were transferred from our skin to high-touch areas. The sources of our phages were a bathroom window, regular door handle, bathroom faucet, as well as a bathroom door handle, demonstrating how truly abundant phages are.
- Finding an alternative therapy to antibiotics remains one of the largest modern health challenges. Using alternatives besides antibiotics ensures prevention against the transmission of antibiotic-resistant genes. Phage therapy utilizes bacteriophages (phages), which are viruses that infect and replicate within bacteria, to treat bacterial infections.



• According to the graph, the results show that the respective places in the household had a high presence of MRSA before the bacteria fully colonized. The children in these households had MRSA infections and the data shows the percentage of bacteria that was transferred on the objects they touched. Since the door handle and bathroom sink were common sites of MRSA, we decided to sample these areas to look for phage activity.

METHODS

- We swabbed high touch surfaces around the house that are commonly associated with MRSA, particularly the bathroom and front door handles, and tested these areas for the presence of phage.
- These samples were placed in phage buffer, vortexed, centrifuged, and filtered. • The filtrate was incubated with growth media (tryptic soy broth) and various
- cultures of S. aureus. The filtrate was then incubated overnight to enrich the sample of phage. These samples were tested for phage using a spot assay. • Using techniques such as a spot titer and full plate titer, we were able to measure the amount of phage lysate.

Bacteriophages Isolated from High Touch Areas



CONCLUSION

- S. Aureus infecting viruses can be found in multiple regions of the house.
- We had success in finding phage on the door handle of the bathroom.
- Since our phage had a low titer, the presence of plaques could not be observed past the second dilution. • Our work demonstrates the value of searching for bacteriophages from atypical sources that harbor host bacteria of
- interest.
- able to isolate the phage for future studies. The next step of our research will involve characterizing the phages and visualizing them through TEM.

FUTURE DIRECTIONS

- Further characterization of the phage
- Genome analysis
- Transmission Electron Microscopy

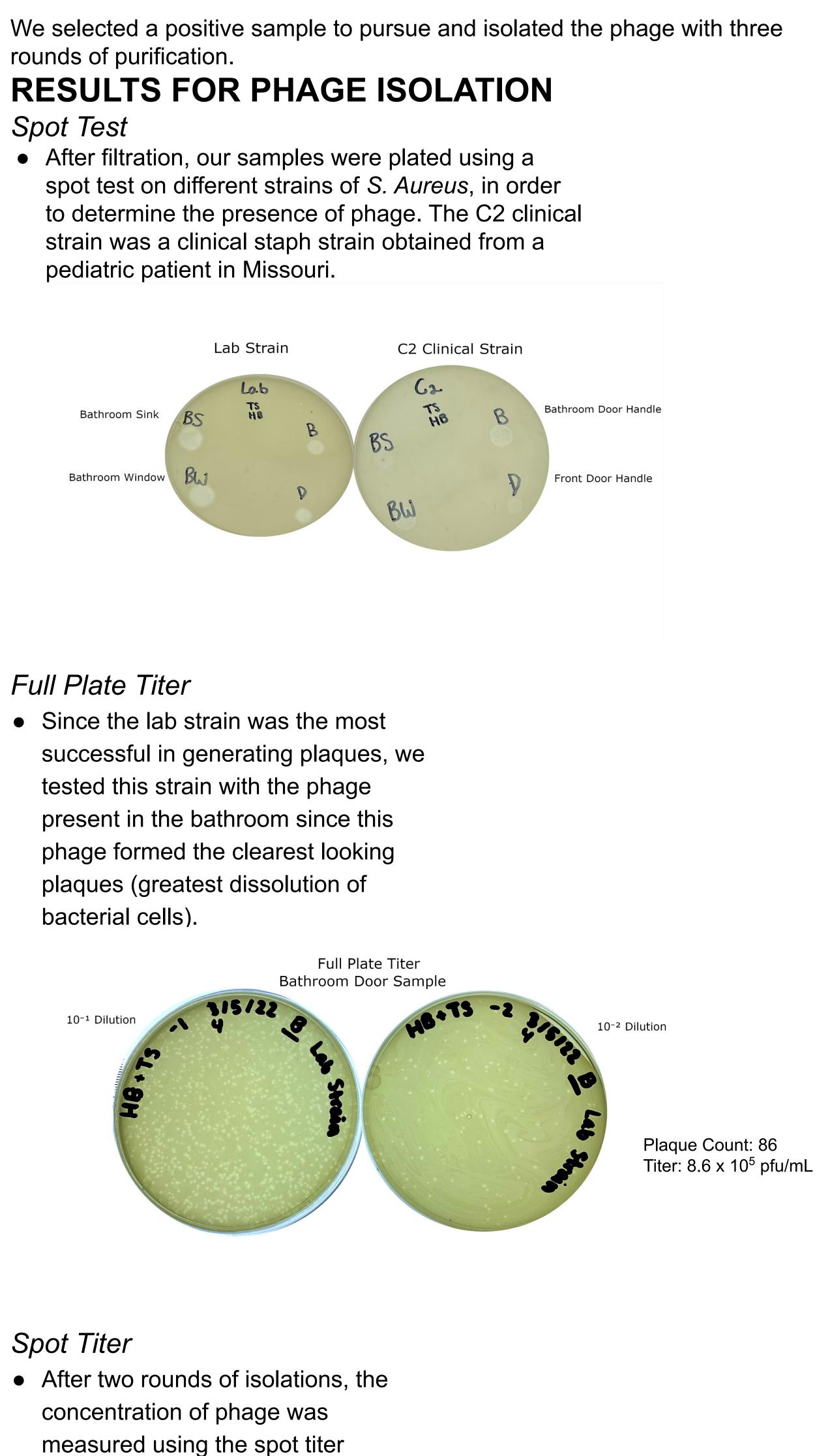


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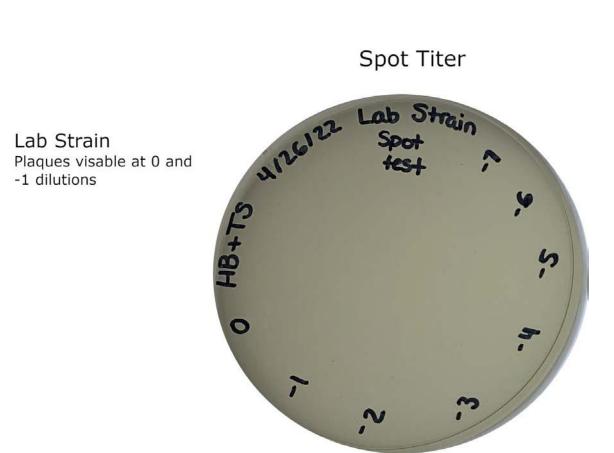
• We were able to find the presence of phage that were swabbed from door handles in the homes, and were successfully







Plaque Count: 6 Titer: 6 x 10⁴ pfu/mL



After third round of isolation

Plaque Count: 6 Titer: 6 x 10² pfu/mL