Microbial Variability in Relation to Student Traffic

Natalie Tejada, Kristin Torre, Zachary Burruano, Katherine Perdomo

Background:

During the winter months in Ithaca, NY, the weather guides students to spend more time indoors populating campus community spaces. As the semester closes in on the halfway point this commingling along with weakened immune systems, due to stress from midterm exams and lack of sleep, is the perfect formula leading to a rise in communicable diseases amongst college students. Infections not only compromise students' physical health but secondarily affect academic performance and mental health as students struggle to catch up on missed work. Scientists Ross and Neufeld assessed biogeography and microbial variability on university campuses utilizing the 16srRNA gene analysis method. 16srRNA is a universal microbial gene commonly used to identify organisms based on signature sequences. Their study provided evidence supporting flourishing biodiversity of microorganisms related to increased interaction between students, faculty and staff on university campuses (Ross, Neufeld, 2015). Microbial variability on university campuses may correlate to increased infection. We hypothesize that the timing of biogeographical assessment affects the microbial variability outcomes. More specifically, we expect to detect greater microbial variability on commonly utilized surfaces during midterm exam week than if these same surfaces are assessed immediately following spring break.

Methods:

Microbial variability will be assessed via aseptic swabbing protocol previously described by Chase et al with some modifications (Chase et al, 2016). Sterile cotton swabs will be immersed in sterile distilled water and swiped onto selected surfaces to collect microbial samples. The swabs will immediately be swiped onto plates containing microbiological growth medium (Mueller Hinton). Plates will be incubated for 24 hours at 37 degrees Celsius. After incubation, microbial growth will be assessed macroscopically by colony morphology and microscopically via Gram Stain. Representative and unique colonies will be further analyzed via biochemical assays and MALDI (matrix assisted laser desorption/ionization) to identify microbial species. Swabbing will be take place on Wednesday, March 6th at 9:00 AM, 1:00 PM, and 4:00 PM, and Monday, March 18th at equivalent times. At each designated time, two computer mouses and two space bars will be swabbed from designated computers in the Center for Health Sciences Library. We expect that samples collected on March 6th, the middle of midterm week, will yield increasing microbial variability at each progressive time point. Additionally, we expect the variability to be greater on this day in comparison to March 18th, the day classes resume post spring break, due to a perceived reduction in students' workload and student traffic. On both days we expect microbial variability to increase with each progressive time point considering the facilities team disinfects surfaces at approximately 5:00 AM. Methodology was approved by the Ithaca College Biosafety Committee.

Results:
We performed pre-test swabbing to validate our methodology. Preliminary data shows that the methodology to collect the samples is effective and appropriate; initial sampling from the Center for Health Sciences Library resulted in growth that is currently being analyzed.

Discussion:
This study will provide evidence on microbial variability within a popular area of congregation in the School of Health Sciences and Human Performance. More importantly it will elucidate whether the timing of sampling impacts outcomes of microbial variability. Outcomes of this study will provide valuable information regarding the current disinfection protocols practiced by the Ithaca College facilities team. Our study may indicate a need for either the placement of signage during high traffic periods warning students of increased risk of microbial variability or perhaps availability of disinfection mechanisms to students during high traffic periods. Implementation of different and beneficial interventions may reduce disease transmission during this key period of time often correlated with weakened student immune responses, potentially contributing to increased academic performance.

References:

Chase J., Fouquier J., Zare M, Sonderegger D. L., Knight R., Kelley S. T., Siegel J., Caporaso J.G. (2016). Geography and location are the primary drivers of office microbiome composition. *mSystems*, *1*(2):e00022-16. doi:10.1128/mSystems.00022-16

Ross, A. A., & Neufeld, J. D. (2015). Microbial biogeography of a university campus. *Microbiome,3*(1). doi:10.1186/s40168-015-0135-0