Cell Phone Hygiene Initiative:

Monitoring and Testing the Use of Cell Phones in the Restroom

Team Members: Joshua Lindsley, M.S., OMS-II, Conner Reynolds, M.S., OMS-II, Trevor Williams, M.S., OMS-II, Jacob Underwood, B.S., Janet Jowitt, BSN, RN, DHA

Background

Preventable medical errors are the third leading cause of death in the United States annually, accounting for 251,000 lives annually (Makary & Daniel, 2016). Healthcare-acquired infections (HAIs) account for nearly 40% of this population, costing the healthcare system $28.4-33.8 billion each year (need to find PDF for first stat).

Current efforts monitoring sources of HAI have set their focus on device-associated infections (i.e. central line, catheter, and ventilator-associated infections). Yet, in a recent Multistate Point-Prevalence Survey of Health Care-Associated Infections, device-associated HAI only accounted for 25.6% of instances detected (Magill et al., 2014). The rising prevalence of smartphone usage has also prompted researchers to target cell phones as potential vectors for infectious transmission in healthcare. Although sophisticated applications may serve as valuable references to physicians and other healthcare professionals, these devices are easily contaminated and rarely disinfected (Chang et al., 2017; Gill, Kamath, & Gill, 2012; Jeske, Tiefenthaler, Hohlrieder, Hinterberger, & Benzer, 2007; Kotris, Drenjancevic, Talapko, & Bukovski, 2017; Mark et al., 2014; Ulger, Dilek, Esen, Sunbul, & Leblebicioglu, 2015). One potential area accounting for significant cell phone contamination is use in restrooms. Little empirical research has been conducted to investigate this proposition, however there are multiple non-peer reviewed sources demonstrating a rise in cell phone usage in restrooms. In a recent survey of 408 Americans, 61% of respondents used their phone in the restroom. This group admitted using their cell phone to check social media (92%), read text messages (49%), and answer phone calls (30%) (Rampton, 2014). There have been several additional reports of individuals admitting to cell phone use on the toilet as well, ranging from 61%-75% (Drewett, 2013; Kelly, 2012; Rampton, 2014).

Aim

Given the diverse microbial biogeography found in public restrooms, cell phone usage is an alarming health concern. The present study aims to provide the first empirical evidence linking restroom cell phone usage to their contamination and subsequent role in HAIs. To do this, we first aim to survey both students and to establish a baseline for the growing population of individuals using their cell phones in the restrooms. We will then aim to assess the degree of pathogenic contamination on subjects' cell phones using an ATP Luminometer

How dirty is your phone?

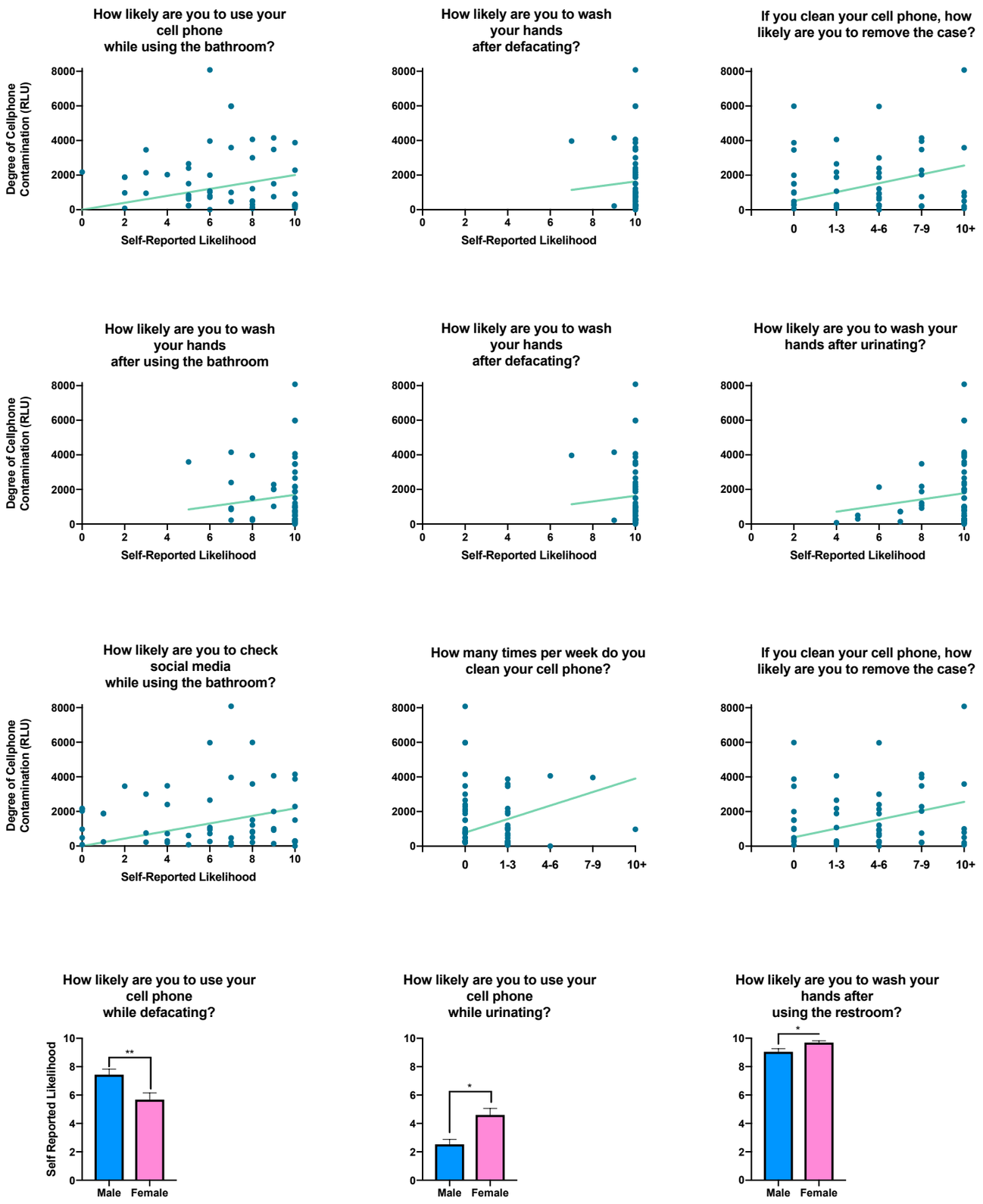
Methods

- The study aims to assess the cell phone hygiene habits of UNTHSC students, faculty, & staff. Using an interval sampling model, subjects using restrooms located on the 1st-4th floors of the MET Building between 12:00PM-1:00PM during the normal school week will be asked to participate in the survey. Student Investigators will administer informed consent & the survey tool using Qualtrics Survey Software on a school-issued laptop after subjects exit the restroom. A unique numerical identifier will be attached to each survey participant for the purpose of linking their responses with degree of cell phone contamination, but no personal identifying or protected health information will be collected from subjects. The distribution of surveys will be overseen by the principal investigator, Dr. Janet Jowitt. All collected data will be stored using a password protected log-in on Qualtrics Survey Software.
- While subjects are taking the survey, Student Investigators will use a standard cotton swab to systematically take a sample of potential pathogens on the subjects' cell phone. The swab will then be placed into an ATP Luminometer, which uses RLU's (relative light units) to quantify the biomass of living organisms on cell phones.

Preliminary Results

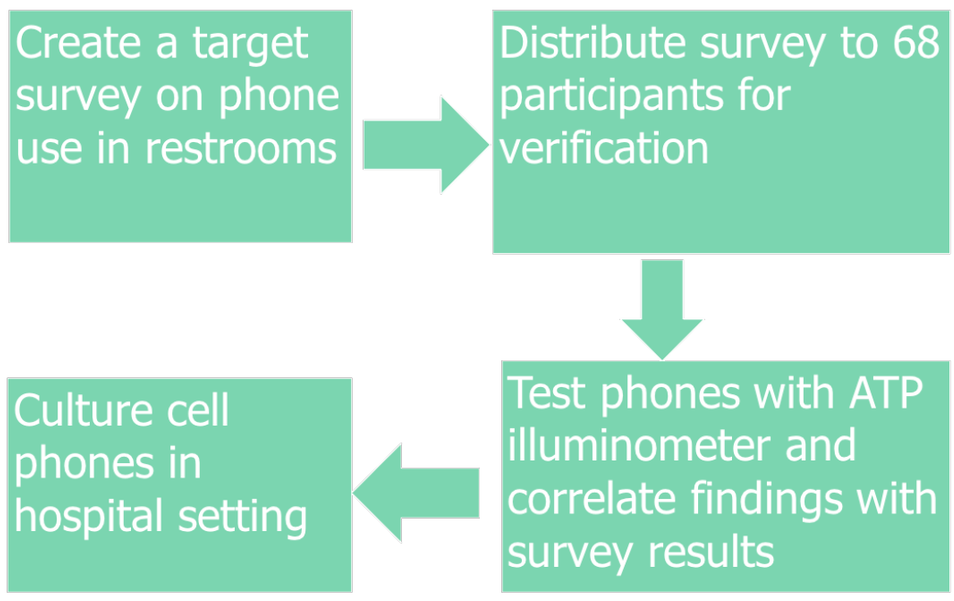
Table 1. Descriptive Statistics for Survey Responses & Cell Phone Contamination

	N	*Minimum*	*Maximum*	*Mean*
With which gender do you identify?	122	1	2	1.46 ± 0.05
On a scale from 0-10, how likely are you to use your phone while in the bathroom?	122	0	10	7.02 ± 2.96
On a scale from 0-10, how likely are you to use your phone when defecating?	122	0	10	6.63 ± 3.45
On a scale from 0-10, how likely are you to use your phone when urinating?	122	0	10	3.48 ± 3.25
On a scale from 0-10, how likely are you to wash hands after using restroom?	121	2	10	9.41 ± 1.27
On a scale from 0-10, how likely are you to check social media while using restroom?	122	0	10	6.07 ± 3.46
On a scale from 0-10, how likely are you to wash your hands after defecating?	122	4	10	9.89 ± 0.63
On a scale from 0-10, how likely are you to wash your hands after urinating?	122	1	10	9.16 ± 1.73
How many times per week do you clean your cell phone?	123	1	5	1.54 ± 0.73
If you wash your phone, how likely are you to remove the case when doing so?	80	1	5	2.79 ± 1.28
Relative Cell Phone Contamination Level	54	3	8082	1634.19 ± 1750.38



Next Steps

Next, we intend to follow previously established protocols for demonstrating that bacteria can be aerosolized and contaminate nearby objects, and apply this principle to cell phones contamination (Barker & Jones, 2005). We will also search potential hand-to-phone contamination prior to hand sanitization when the cell phone is being put away. If we are able to empirically establish that restrooms may act as an index site for cell phone contamination, we would seek to generate an infographic to educate healthcare workers on the risks associated with restroom cell phone usage, as well as explore possible avenues for cell phone decontamination in restrooms.



Works Cited

- Chang, C. H., Chen, S. Y., Lu, J. J., Chang, C. J., Chang, Y., & Hsieh, P. H. (2017). Nasal colonization and bacterial contamination of mobile phones carried by medical staff in the operating room. *PLoS One, 12*(5), e0175811. doi:10.1371/journal.pone.0175811
- Drewett, M. (Producer). (2013). 75% of people use their phone on the toilet. Retrieved from http://www.digitalspy.com/fun/news/a464219/75-of-people-use-their-phone-on-the-toilet/
- Gill, P. S., Kamath, A., & Gill, T. S. (2012). Distraction: an assessment of smartphone usage in health care work settings. *Risk Management and Healthcare Policy, 5*, 105-114. doi:10.2147/RMHP.S34813
- Jeske, H. C., Tiefenthaler, W., Hohlrieder, M., Hinterberger, G., & Benzer, A. (2007). Bacterial contamination of anaesthetists' hands by personal mobile phone and fixed phone use in the operating theatre. *Anaesthesia, 62*(9), 904-906. doi:10.1111/j.1365-2044.2007.05172.x
- Kelly, T. (Producer). (2012). Toilet Texting, Bathroom Browsing On The Rise, Study Says. Retrieved from https://www.huffingtonpost.com/2012/02/01/toilet-texting-study_n_1245290.html
- Kotris, I., Drenjancevic, D., Talapko, J., & Bukovski, S. (2017). Identification of microorganisms on mobile phones of intensive care unit health care workers and medical students in the tertiary hospital. *Med Glas (Zenica), 14*(1), 85-90. doi:10.17392/878-16
- Magill, S. S., Edwards, J. R., Bamberg, W., Beldavs, Z. G., Dumyati, G., Kainer, M. A., . . . Antimicrobial Use Prevalence Survey, T. (2014). Multistate point-prevalence survey of health care-associated infections. *N Engl J Med, 370*(13), 1198-1208. doi:10.1056/NEJMoa1306801
- Makary, M. A., & Daniel, M. (2016). Medical error—the third leading cause of death in the US. *BMJ, 353*.
- Mark, D., Leonard, C., Breen, H., Graydon, R., O'Gorman, C., & Kirk, S. (2014). Mobile phones in clinical practice: reducing the risk of bacterial contamination. *Int J Clin Pract, 68*(9), 1060-1064. doi:10.1111/ijcp.12448
- Rampton, J. (Producer). (2014). How Many People Use Their Phone In The Bathroom? Retrieved from https://www.inc.com/john-rampton/how-many-people-use-their-phone-in-the-bathroom.html
- Ulger, F., Dilek, A., Esen, S., Sunbul, M., & Leblebicioglu, H. (2015). Are healthcare workers' mobile phones a potential source of nosocomial infections? Review of the literature. *J Infect Dev Ctries, 9*(10), 1046-1053. doi:10.3855/jidc.6104