SURFACE SAMPLING AND DETECTION INVESTIGATIONS AT THE CDC. L. J. Rose[1] and A. D. Coulliette[2], ([1]Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, 1600 Clifton Rd, MS C-16, Atlanta GA 20329. LRose@cdc.gov) ([2]Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, 1600 Clifton Rd, MS C-16, Atlanta GA 20329. ACoulliette@cdc.gov).

Introduction: The Environmental and Applied Microbiology Team is a group of microbiologists within the Division of Healthcare Quality Promotion that is tasked with investigating disease outbreaks in healthcare settings. During the course of these investigations, questions have arisen as to the efficiency of the available sampling and detection methods. In order to better understand and optimize sampling and detection of microorganisms, the team has undertaken several applied research endeavors. This presentation will summarize and discuss some of our work and findings.

Sampling devices: The team has investigated the efficiency of devices such as swabs [1], sponges [2], gauze wipes and vacuum devices [3] to pick up a variety of organisms from several surface types and the efficiency of the devices to release the organisms into solution. Organisms evaluated include multi-drug resistant bacteria such as Methicillin resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile* spores, and *Acinetobacter baumanii*, as well as biothreat organisms like *Bacillus anthracis* spores.

Surface: The efficiency of the sampling and detection is influenced by the characteristics of the surface materials the organisms are sampled from, such as roughness, porosity and hydrophobicity. Each sampling device also has a limit as to the surface area that is optimum to sample before efficiency is lost. We investigated the use of composite sampling for one study[4], in which each side of one sponge sampling device was used for several sites in a room.

Detection: Culture has been the primary method of detection for the organisms investigated, since we have found that the limit of detection is significantly lower than for detection with molecular methods such as qPCR, and because we need to know the organism is viable. The sampling and detection method should therefore be chosen based on the objectives of the sampling and how the results can inform decisions and actions required to protect public health.

Culture Gaps. Growth of the target organisms without overgrowth of background organisms has been a challenge. Though selective media is available for some of our target organisms, they are not always time efficient or effective for a given environmental consortia. In addition, after disinfection or dessication, organisms may be injured and viable but non-culturable, leading to false negative detection results.

Molecular Detection Gaps. Limit of detection is a significant gap. Though PCR assays can be sensitive, since typically a volume of only 5µL is in the reaction well, concentration of the sample eluate without concentration of background organisms and/or assay inhibitors is required, and has proven to be a challenge.

References:

[1] Hodges L. R. (2010) *J Microbiol Meth, 81,* 141-146. [2] Rose L. J. et al. (2011) *Appl Envron Micobiol, 77,* 8355-8359. [3] Calfee M. W. et al. (2013) *J Microbiol Meth, 95,* 389-396. [4] Shams A.M. et al. (2014) *IDSA ID Week,* Abstract #1366.