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Sampling and Analytical Technique Considerations for Microbial Surface Swab Testing

Cleaning and sanitization efficacy measurements depend upon off line analytical measurements made up of three separate standard operating procedures (SOPs). One for the taking of the sample, one for the preparation of the sample, and finally the SOP for the analysis of the sample taken.

Many times these SOPs are completed by different people. The results are dependent upon the strict adherence to each SOP. The variability in the analytical device measurement itself is usually not the issue, but the taking of the sample and the preparation of the sample for analysis is where the overall measurement can give misleading results.

In microbial surface sample taking (swabbing), many of the techniques are dependent upon the training and consistency of the technique used by the person performing the sampling task.

Surface Sampling Standard Operating Procedure (SOP) Considerations

Standardization of both the swabbing pattern and the pressure applied to the swab during sampling decreases the variability in the results.

The basis of all swabbing protocols must be to sample the surface to be analyzed using a constant rubbing pattern of the swab within defined areas of the surface.

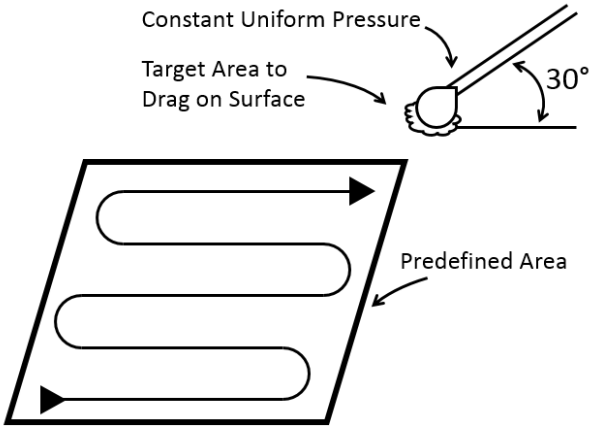
The two main factors influencing the amount of mechanical energy that can be generated during swabbing are the inherent properties of the swab bud itself and the degree of pressure is applied to the swab during sampling.

It is also important to document the variability between technicians and experience level of the sampling operators to determine the possible cause for discrepancies in the results.

1. Swabbing protocols and standard operating procedures (SOPs) for each type of surface must be standardized
2. Hands-on training in the use of the protocols and a statistical analysis of technician variability will insure the data analysis yields solutions for the problems discovered versus questions about the data
3. The path pattern and total lengths of travel for the swab tab over each type of surface must be the same.
4. The persons doing the sampling must be trained to follow the details of the SOP.
5. The most critical variable in swabbing is the pressure the person performing the swab (“the swabber”) exerts on the swab bud while rubbing over a surface.

A typical swabbing protocol:

Step 1: Remove the sterile pre-moistened swab from tube.
Step 2: Squeeze off excess liquid on the swab by pressing it against the interior wall of the tube.
Step 3**:** Hold swab handle at a 30˚ angle to surface being swabbed.
Step 4: Rub the swab slowly and thoroughly over the surface following a consistent pattern
Step 5: Apply the same consistent pressure to the swab as it contacts the surface



Swabbing Protocol

Step 6: After the surface has been swabbed, place the swab in the tube of rinse solution.
Step 7: Screw cap on tightly. Mix well.

Sample Preparation SOP Considerations

The release of bacteria from the swab bud is the most important factor in the recovery of microorganisms during sample preparation. If the microorganisms remain in the swab bud, the results will mislead even though the analytical device's repeatability and recovery statistics will show that it is well within its operating specifications.

The swab tube solution carries the swab's material and is able to be transferred to the plate or test cell. This transfer is critical as losses occur differently depending upon the analytical method used for determining the microbial counts or concentration.

Unless the swab would completely dissolve into the solution, some hold up of material will occur in the physical voids of the swab material.

The trick here is to be consistent in technique and have an evaluative understanding of the variability inherent in the different technicians and sample preparation operators detail manual techniques.

Many times experienced technicians have formed habits in sample prep that may or may not be consistent with colleagues and the understanding of the details is sometimes assumed versus demonstrated. A way to determine this variability is to have similar samples compared statistically against each of the technician's results.

In addition, many times in labs, the newest colleague completes much of the routine sample preparation. Again, a statistically determined baseline of variability will save much forensic investigation as to the source for either process problems or analytical technique results

Sample Analysis Measurement SOP

The precision and accuracy of the measurement device themselves are usually not the problem. Many times mistakenly, a lab will claim the machine's precision and accuracy without considering the variability from the sampling or the sample preparation techniques. Most times the SOPs preceding the actual measurement is where the variability in the result is most effected.

A routinely calibrated and properly used ATP luminometer will almost invariably produce a number that accurately reflects the number of ATP molecules that have been released from the ATP-containing sample placed in the luminometer.

The claims of the machine accuracy may not matter much in the determination of before clean and after cleaning efficacy. It is the difference before and after that matters.

The precision is most likely critically influenced more by the swabbing technique and sample preparation. This is where the majority of the measurement technique details development effort should be focused.

Precision refers to how closely the results are grouped from any repeated action. Accuracy refers to how closely the results of any repeated action are to what is desired from the action.