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## MICROBIOLOGICAL TEST REPORT

DATE of REPORT: 26/11/14

CUSTOMER: Clever Hygiene Solutions Ltd., 95 Ranelagh Village, Dublin 6  
Attention: Mr Brian Cunningham

ANALYSES REQUIRED: Determination of antimicrobial efficacy of the Hygiene Handle System in uncontrolled, in-use, community conditions.

### TEST METHODS:

EN 1040 Basic Bactericidal Activity of Chemical Disinfectants

EN 13697 Quantitative Surface Test for the Evaluation of Bactericidal or Fungicidal Activity

Customised swabbing and recovery protocol for irregular surfaces using neutralising recovery buffer and L Agar incorporating same as per ISO 18593:2004

OPERATIVE: Catherine Hannon

DATE TESTING COMMENCED: 14/01/13 et seq

### Introduction

The Handle Hygiene System has been developed and refined over a period of several years as a simple delivery mechanism to reduce contamination and infectious risk associated with manually contacting door handles and push panels. It is designed to work with many types of handles but is optimal when used with its own design of handle. In summary, the system automatically delivers a metred dose of antimicrobial to the manual contact point each time the door closes. This sanitises the contact point, ready for the next user and will also transfer a thin film of sanitiser to the user's hand for additional protection. The system is designed to be particularly effective in areas of high risk to hygiene e.g. doors in close proximity to food preparation areas or in healthcare facilities or in areas where poor hygiene practices may be prevalent e.g. heavily used or poorly maintained toilets. The antimicrobial sanitiser may be calibrated to the location risk, compatibility with requirements or integrated as part of local infection control regimes.

## Testing protocol

The approach taken to testing was as follows:

A range of antimicrobial solutions were subjected to several selection criteria at their normal working strength and half their normal working strength.

Firstly, they were subjected to the EN1040 Standard test for basic bactericidal activity of chemical disinfectants which requires a 5 log reduction in  $\leq 5$  minutes of two bacterial species, **Staphylococcus aureus** and **Pseudomonas aeruginosa**.

Secondly, they were subjected to the EN 13697 Standard quantitative surface test for evaluation of bactericidal and fungicidal activity which requires a 4 log reduction of bacteria in  $\leq 5$  minutes and a 3 log reduction of fungi in  $\leq 15$  minutes. The test panel of organisms included **Staphylococcus aureus**, **Pseudomonas aeruginosa**, **Enterococcus hirae**, **Escherichia coli**, **Candida albicans** and **Aspergillus brasiliensis**.

Two of the solutions (Bytrol, Daresbury and SureClean, Edmar Chemical Co. Ohio) passed both of these tests at half their working strength and these were used for field-testing the delivery system at their normal working dilution.

A number of moderate usage and heavy usage door handles were included in the study. These were mainly of the pull handle variety and were located on male and female toilet doors and laboratory doors in Trinity College.

In the study, baseline contamination levels were first determined over the course of one week periods for each of the handles and at intervals thereafter, whenever sanitising solutions were withdrawn.

Similar sampling was undertaken over the course of subsequent one week periods when the respective sanitising solutions were in use with the Handle Hygiene systems.

Sampling was carried out by swabbing standardised areas on the handles in a reproducible manner over the course of the study and transferring to plates of L Agar containing sanitiser neutralising agents. Results from the test plates were compared with the baseline studies to indicate hygienic efficacy of the various treatments.

## RESULTS

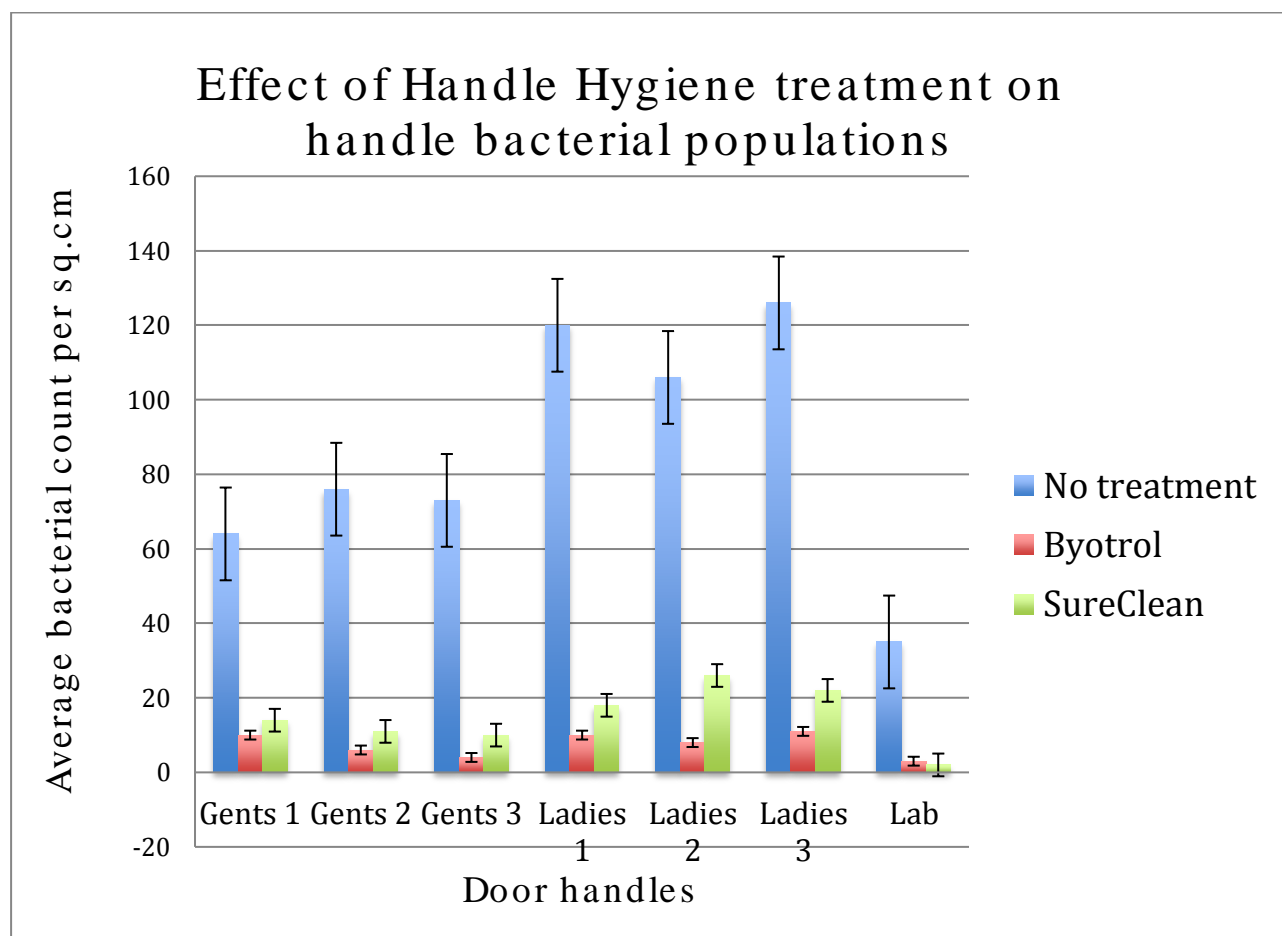
The baseline studies in which no sanitiser was present showed that counts on the handles of all of the gents toilets averaged around 70 bacteria per square centimetre. This was regardless of whether the toilet was moderately busy (1) or very busy (2 and 3).

The female toilets showed a different baseline pattern with counts averaging around 120 bacteria per square centimetre on the handles. From observation, approximately the same number of males and females were using the toilets. Again, there seemed to be no significant difference in counts between the moderately busy toilet (1) and the very busy toilets (2 and 3).

The baseline counts on the laboratory door handle were quite low, never going above 40 per square centimetre. This is probably due to the fact that most users would have washed their hands prior to leaving as a routine action.

When the Handle Hygiene system was activated and using either of the sanitisers, a great reduction in counts was noted in every single case with the counts coming down to 20 per square centimetre or less. This was true for both the male and female toilet door handles whilst the laboratory door handle counts reduced to an average of 2 per square centimetre.

A slight difference in efficacy of the sanitising solutions was observed with Byotrol performing slightly better than SureClean in each instance. It was noted that when the sanitisers were removed, bacterial counts returned to the baseline levels however, this took longer to occur with Byotrol than with SureClean.



## Conclusions

The results clearly show that the handle hygiene system is effective in delivering sanitiser to door handles with the concomitant reduction in bacterial counts. The handles in both gents and ladies toilets (2 and 3) were very heavily used at times. The location was in a student bar with toilet doors opening several times per minute during busy periods.

Despite this, bacterial counts remained quite low while the Handle Hygiene system was actively dispensing sanitiser.

The observation that Byotrol's effect lasted longer than SureClean after withdrawal seems to indicate an ability to maintain some residual effect on the handle surface. This would need further investigation, however the effect was noted on a number of occasions.

Viable count or colony forming units per  $\text{cm}^2$  (cfu/  $\text{cm}^2$ ) is the standardized measure of how clean or dirty a surface is in microbiological terms. In the meat industry,  $>10$  cfu/  $\text{cm}^2$  is regarded as unacceptable (a). In healthcare,  $<2.5$  cfu/  $\text{cm}^2$  is the required standard post-cleaning with  $<5$  cfu/  $\text{cm}^2$  for hand contact surfaces (b) (c). It is probable that toilet door handles in this study are not much different from those in healthcare or food establishments. It is easy to see how implementation of the Handle Hygiene system could help improve hygiene and reduce risk in those environments.

The studies undertaken here were subject to many variables but reflect real usage. The door handles were not altered in any way for the study but it is almost certain that the results in this study could be improved on through the use of angled handles.

#### References

(a) **Commission Decision** (2001/471/EC)

(b) **Dancer SJ**. 2004. How do we assess hospital cleaning? A proposal for microbiological standards for surface hygiene in hospitals. *The Journal of Hospital Infection* **56**:10-15.

(c) **Schmidt MG, Attaway HH, Sharpe PA, John J, Jr., Sepkowitz KA, Morgan A, Fairey SE, Singh S, Steed LL, Cantey JR, Freeman KD, Michels HT, Salgado CD**. 2012. Sustained Reduction of Microbial Burden on Common Hospital Surfaces through Introduction of Copper. *Journal of Clinical Microbiology* **50**:2217-2223.

SIGNED:



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**Note:** Results apply only to the samples tested. The report shall not be reproduced, except in full, without approval from this laboratory.