

1. Results

1.1 *Escherichia coli* controls

| Control keys | | <i>E.coli</i> recovered per key | % Kill |
|--------------|------|---------------------------------|--------|
| | | cfu per key | |
| 1 | | 17 000 000 | - |
| V | | 12 900 000 | - |
| X | | 9 300 000 | - |
| | | | |
| | Mean | 13 066 667 | |

1.2 *Escherichia coli* 1 treatment cycle

| Test Keys | | <i>E.coli</i> recovered per key | % Kill |
|-----------|--|---------------------------------|---------|
| | | cfu per key | |
| 3 | | >500 000 | <96.174 |
| # | | 120 000 | 99.082 |
| F8 | | 11 000 | 99.916 |
| D | | 200 000 | 98.470 |
| Shift | | >500 000 | <96.174 |

1.3 *Escherichia coli* 2 treatment cycle

| Test Keys | | <i>E.coli</i> recovered per key | % Kill |
|-----------|--|---------------------------------|--------|
| | | cfu per key | |
| 3 | | 320 000 | 97.552 |
| # | | 16 000 | 99.878 |
| F8 | | 100 | 99.999 |
| D | | 138 000 | 98.944 |
| Shift | | 240 000 | 98.164 |

1.4 *Escherichia coli* 10 treatment cycle

| Test Keys | | <i>E.coli</i> recovered per key | % Kill |
|-----------|--|---------------------------------|---------|
| | | cfu per key | |
| 3 | | 15 000 | 99.885 |
| # | | 50 | 100.000 |
| F8 | | 50 | 100.000 |
| D | | 6 900 | 99.947 |
| Shift | | 140 000 | 98.929 |

2.1 *Staphylococcus aureus* controls

| Control keys | | <i>S. aureus</i> recovered per key | % Kill |
|--------------|------|------------------------------------|--------|
| | | cfu per key | |
| M | | 3 300 000 | - |
| 5 | | 3 800 000 | - |
| A | | 5 100 000 | - |
| | | | |
| | Mean | 4 066 667 | |

2.2 *Staphylococcus aureus* 1 treatment cycle

| Test Keys | | <i>S. aureus</i> recovered per key | % Kill |
|-----------|--|------------------------------------|--------|
| | | cfu per key | |
| 3 | | 800 000 | 80.325 |
| Delete | | 67 000 | 98.352 |
| F8 | | 4 600 | 99.887 |
| D | | 260 000 | 93.606 |
| Shift | | 1 200 000 | 70.487 |

2.3 *Staphylococcus aureus* 2 treatment cycle

| Test Keys | | <i>S. aureus</i> recovered per key | % Kill |
|-----------|--|------------------------------------|--------|
| | | cfu per key | |
| 3 | | 500 000 | 87.703 |
| Delete | | 7 700 | 99.811 |
| F8 | | 500 | 99.988 |
| D | | 95 000 | 97.664 |
| Shift | | 760 000 | 81.308 |

2.4 *Staphylococcus aureus* 10 treatment cycle

| Test Keys | | <i>S. aureus</i> recovered per key | % Kill |
|-----------|--|------------------------------------|---------|
| | | cfu per key | |
| 3 | | 5 600 | 99.862 |
| Delete | | 50 | 99.999 |
| F8 | | 0 | 100.000 |
| D | | 500 | 99.988 |
| Shift | | 8 200 | 99.798 |

3.1 *Bacillus subtilis* controls

| Control keys | | <i>B. subtilis</i> recovered per key | % Kill |
|--------------|------|--------------------------------------|--------|
| | | cfu per key | |
| Y | | 10 150 | - |
| \$ | | 10 350 | - |
| L | | No result | - |
| | Mean | 10 250 | |

3.2 *Bacillus subtilis* 1 treatment cycle

| Test Keys | | <i>B. subtilis</i> recovered per key | % Kill |
|-----------|--|--------------------------------------|--------|
| | | cfu per key | |
| 3 | | 50 | 99.512 |
| Delete | | 50 | 99.512 |
| F8 | | 50 | 99.512 |
| D | | 300 | 97.073 |
| Shift | | 500 | 95.122 |

3.3 *Bacillus subtilis* 2 treatment cycle

| Test Keys | | <i>B. subtilis</i> recovered per key | % Kill |
|-----------|--|--------------------------------------|---------|
| | | cfu per key | |
| 3 | | 50 | 99.512 |
| Delete | | 0 | 100.000 |
| F8 | | 0 | 100.000 |
| D | | 0 | 100.000 |
| Shift | | 200 | 98.049 |

3.4 *Bacillus subtilis* 10 treatment cycle

| Test Keys | | <i>B. subtilis</i> recovered per key | % Kill |
|-----------|--|--------------------------------------|---------|
| | | cfu per key | |
| 3 | | 50 | 99.512 |
| Delete | | 0 | 100.000 |
| F8 | | 0 | 100.000 |
| D | | 0 | 100.000 |
| Shift | | 0 | 100.000 |

Discussion

Germ Genie experiments on *E.coli* revealed significant and repeatable reductions in numbers over 1, 2 and ten cycles of treatment. Large numbers of the test bacteria were deposited and recovered from the control keys after 20 minutes. When subjected to any cycles of treatment by Germ Genie numbers of the bacteria were severely depleted with kill rates of between 96% on outer keys, 99% on mid-range keys and 99.9% on central keys. After two cycles kill-rates increased further on all parts of the keyboard, while after ten cycles all keys displayed at least three-log decreases in numbers.

S aureus tests found similar results except kill-rates on the outer keys only reached between 70% and 80% after one cycle of treatment. Results from the mid-range and central keys showed between 97.6% and 99.9% kill rates after two cycles. All keys showed at least 99.8% kill rates after ten cycles.

Tests on *B subtilis* proved more difficult, as depositing large numbers of the test bacteria on control keys proved to be rather problematic. However, even with a reduced starting population the results for 1, 2 and 10 cycles generally followed the same pattern as with the other test cultures. Numbers rapidly reduced after one cycle, and kill-rates after ten cycles were found to be reduced by more than three log-units.

Conclusion

Tests on Germ Genie revealed significant and consistent anti-microbial effects under the conditions tested. One cycle of treatment was found to have a significant impact of recoverable cell numbers, while ten cycles often resulted in a three log-unit decrease in numbers. This decrease represents more than 99.9% of cells being killed over the Germ Genie cycles. It is concluded that ultra-violet light treatment as applied by the Germ Genie provides an extremely hostile environment for any transient bacteria deposited on the keyboard.



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25 October 2010
Date