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Hygiene Expert Opinion to the Medical Desktop Keyboards K1-MED (PS00430), K2-MED (PS00420) and K20-MED-TP (PS00380) of Prokeys (Kirchberg, Germany)

We were asked to clarify, whether the three medical computer keyboards fit the hygienic requirements to be used in hygienic critical areas, such as in an operating theatre. A safe disinfection of all surface areas must be carried out in these facilities due to the distinct infectious risks of patients. Any possible risk of the patient outgoing from the device has to be excluded. The potentiality of a reliable disinfection of the K-MED computer keyboards should be checked on the basis of the guideline for “the test and assessment of chemical disinfection methods” of the German Society for Hygiene and Microbiology (DGHM). The examinations were carried out with regard to the test organisms in analogy and in accordance with the specifications of the German society for hygiene and microbiology (DGHM) for disinfection methods in a microbiological burden test under practical conditions.

1. Test Object

For the examinations three models of the K-MED series (K1-MED, K2-MED, K20-MED-TP) were provided for the disinfection tests. The computer keyboards were specifically developed for the use in operating theatres and intensive care units. The silicon-coated keyboards fulfil the criteria of IP68 with a plain and smooth surface and are protected from dust and splashing water. The three series are mostly identical constructed. Only the sizes of the cases are different and model K20-MED-TP is additionally equipped with a touchpad.

2. Detailed Study

The particular object was contaminated with the test microorganisms on appropriate and crucial to be disinfected areas. To this, 0.1 ml of the respective solution of microorganisms was brought up to the selected localizations. That was: different areas on the surface, the side and the bottom. In order to include

areas which are difficult to be disinfected, especially the transition of the key drops and the weld at the back as well as the USB supply line and in case of K20-MED-TP the touchpad were selected.

After drying of the solution, disinfection was carried out with Terralin liquid® (conc., 15min) and with the glycol-based Terralin protect® (0.5%, 60min and 2%, 15min). Both products are permitted for floor disinfection and are approved by the VAH (The German Society for Applied Hygiene). A quantitative and qualitative microbiological examination was carried out subsequently.

3. Test Organisms

<i>Staphylococcus aureus</i>	ATCC 6538
<i>Enterococcus faecium</i>	ATCC 5037
<i>Enterococcus hirae</i>	ATCC 10541
<i>Escherichia coli</i>	ATCC 11229
<i>Pseudomonas aeruginosa</i>	ATCC 15442
<i>Proteus mirabilis</i>	ATCC 14153
<i>Candida albicans</i>	ATCC 10231

4. Concentrations of Microorganisms

<i>Staphylococcus aureus</i>	ATCC 6538	4.0 x 10 ⁶ cfu/ml
<i>Enterococcus faecium</i>	ATCC 6057	1.0 x 10 ⁶ cfu/ml
<i>Enterococcus hirae</i>	DSM 3320	4.0 x 10 ⁶ cfu/ml
<i>Escherichia coli</i>	ATCC 11229	4.0 x 10 ⁶ cfu/ml
<i>Pseudomonas aeruginosa</i>	ATCC 15442	3.4 x 10 ⁶ cfu/ml
<i>Proteus mirabilis</i>	ATCC 14153	3.0 x 10 ⁶ cfu/ml
<i>Candida albicans</i>	ATCC 10231	1.0 x 10 ⁶ cfu/ml
<i>Aspergillus niger</i>	ATZCC 16404	1.5 x 10 ⁶ cfu/ml

5. Results

With each microorganism 12 different areas of the objects were contaminated in the case of K20 14 checkpoints were selected that overall all possible areas of the object were covered. Each test was repeated five times.

Staphylococcus aureus ATCC 6538, concentration 4.0×10^6 cfu/ml

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	4.0×10^6	4.0×10^6	0.1×10^6
6 x bottom	4.0×10^6	4.0×10^6	4.0×10^6
2 x touchpad	-	-	4.0×10^6
Total reduction	4.0×10^6	4.0×10^6	1.7×10^6

Enterococcus faecium ATCC 6057, concentration 1.0×10^6 cfu/ml

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	1.0×10^6	1.0×10^6	1.0×10^6
6 x bottom	1.0×10^6	1.0×10^6	1.0×10^6
2 x touchpad	-	-	1.0×10^6
Total reduction	1.0×10^6	1.0×10^6	1.0×10^6

***Enterococcus hirae* DSM 3320, concentration 4.0×10^6 cfu/ml**

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	4.0×10^6	4.0×10^6	4.0×10^6
6 x bottom	4.0×10^6	4.0×10^6	4.0×10^6
2 x touchpad	-	-	4.0×10^6
Total reduction	4.0×10^6	4.0×10^6	4.0×10^6

***Escherichia coli* ATCC 11229, concentration 4.0×10^6 cfu/ml**

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	4.0×10^6	4.0×10^6	4.0×10^6
6 x bottom	4.0×10^6	4.0×10^6	4.0×10^6
2 x touchpad	-	-	4.0×10^6
Total reduction	4.0×10^6	4.0×10^6	4.0×10^6

***Pseudomonas aeruginosa* ATCC 15442, concentration 3.4×10^6 cfu/ml**

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	3.4×10^6	3.4×10^6	0.1×10^6
6 x bottom	3.4×10^6	3.4×10^6	3.4×10^6
2 x touchpad	-	-	3.4×10^6
Total reduction	3.4×10^6	3.4×10^6	2.0×10^6

***Proteus mirabilis* ATCC 14153, concentration 3.0×10^6 cfu/ml**

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	3.0×10^6	3.0×10^6	3.0×10^6
6 x bottom	3.0×10^6	3.0×10^6	3.0×10^6
2 x touchpad	-	-	3.0×10^6
Total reduction	3.0×10^6	3.0×10^6	3.0×10^6

***Candida albicans* ATCC 10231, concentration 1.0×10^6 cfu/ml**

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	1.0×10^6	1.0×10^6	1.0×10^6
6 x bottom	1.0×10^6	1.0×10^6	1.0×10^6
2 x touchpad	-	-	1.0×10^6
Total reduction	1.0×10^6	1.0×10^6	1.0×10^6

***Aspergillus niger* ATCC 16404, concentration 1.5×10^6 cfu/ml**

Checkpoint	K1-MED	K2-MED	K20-MED
	RR log10	RR log10	RR log10
6 x topside	1.5×10^6	1.5×10^6	0.6×10^6
6 x bottom	1.5×10^6	1.5×10^6	0.6×10^6
2 x touchpad	-	-	0.6×10^6
Total reduction	1.5×10^6	1.5×10^6	0.6×10^6

6. Advisory Opinion

The hygienic examination of the medical computer keyboards K1-MED, K2-MED und K20-MED-TP for use in medically sensitive areas yielded a high reduction of the test organisms by disinfection with products from the VAH list. Mostly a reduction rate of 6.0 (\log_{10}) was determined. This goes beyond the requested amount of a \log_{10} reduction of 5.0 and is sufficient in every case.

On the basis of the test results the keyboards can be used without risk in hygienic sensible areas of hospitals if disinfection is carried out correctly with preparations and application times in accordance with the VAH list.

The hygiene standard of the K-MED computer keyboards is classified as very high. The use in hygienic sensitive areas is recommended.

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