

## Evaluating Revolutionary Protective Solutions Ltd 'Aqueous Guard® ABV Cleaner' in a Primary Care Setting

### Improvement Issue and Context

Environmental surfaces play an important role in microbial transmission across a range of clinical settings<sup>1, 2</sup> and it is accepted that cleaner clinical environments reduce the risk of infection.<sup>3,4</sup>

Whilst 'hospital acquired' infections and outbreaks often make frequent media headlines the community or primary care settings such as GP surgeries, nursing and residential homes also pose a very real infection risk to healthcare workers, patients and visitors.

Therefore effective cleaning and disinfection of these primary care settings reduces the risk of infection or transmission posed by these facilities.

### Aim

The aim of this work was to benchmark the level of soiling / organic matter at multiple locations within a GP surgery and a residential care home and to compare the level of soiling at these locations before and after cleaning and disinfection with Aqueous Guard® ABV Cleaner.

### Methods and Measurement

Adenosine Tri-Phosphate (ATP) swab testing was performed at each test location and provides an objective measure of cleanliness.

ATP swab test locations were chosen to represent variations in frequency of human contact, frequency of intensive cleaning and relevance to the healthcare process (i.e. the sphygmomanometer representing a frequently used, healthcare-related location; children's toy bricks representing a less frequently used, non-healthcare related location).

In each test location ATP swab tests were taken for several weeks before the application of Aqueous Guard® ABV Cleaner. This provided a background ATP reading which could be used as a 'benchmark' against which the impact of Aqueous Guard® ABV Cleaner could be measured.

Each ATP test was taken over an area of 100cm<sup>2</sup> (i.e. 10cm x 10cm) and swab testing was performed using an Ultrasp® swab which was immediately inserted into the Bioscience NG bioluminescence measurement device. Areas were swabbed in a close zig-zag pattern in one direction, then at right angles and then again in the original direction. All swabbing was performed at the end of the working day, same day of the week, before the daily cleaning process.

No alterations were made in the standard cleaning processes in the buildings. Standard cleaning consisted of a two-stage process involving stage 1, a wipe over with neutral detergent, followed by stage 2, a wipe over with a sodium hypochlorite solution (at 1000ppm available chlorine).

In week four, cleaning at the test sites was performed using Aqueous Guard® ABV Cleaner ready for use spray (Figure 1) in place of the standard cleaning process, and ATP swabs were taken 20 minutes after application of the Aqueous Guard® products. In subsequent weeks the normal cleaning regime was resumed and routine samples were taken from the same locations, at the same time of day and day of the week. In the GP surgery the evaluation took place over an 8 week period with Aqueous Guard® ABV Cleaner being used only once – at the beginning of week 4. In the care home the evaluation took place over a 14 week period with Aqueous Guard® AV Cleaner being used at week 4 and week 8.

ATP bioluminescence uses Relative Light Units (RLU) to quantify the level of soiling / organic matter present on a surface. In broad terms, lower ATP scores equate to a cleaner surface with less organic matter / soiling. The following RLU levels were used to interpret the swab test results:-

0 – 150	Acceptable autoclaved levels for surgical instruments
151 – 300	Acceptable in intensive or deep cleaning procedures
301 – 500	Acceptable level for food surface production Locations and equipment
501 – 1000	Clean domestic surfaces
1001 – 10000	Infrequently cleaned and unsafe surfaces
10,001+	Highly contaminated and unsafe surfaces

In addition to extensive ATP swab testing, several test locations at the GP surgery also had Total Viable Count (TVC) of microbes reported both pre and post cleaning with Aqueous Guard® ABV Cleaner. TVC determination on surfaces using dip-slides is an established method used to quantify the number of microbes (bioburden) present on surfaces.

### Evidence of Improvement

ATP swab test results for the GP surgery are reported below in Table 1 with additional data relating to Total Viable Count of microbes reported in Table 2. ATP swab test results for the Residential Care Home are reported in Table 3.

### References

1. Otter JA, Yezli S, French GL. The role played by contaminated surfaces in the transmission of nosocomial pathogens. Infect Control Hosp Epidemiol 2011 Jul;32(7):687-99.
2. Pyrek KM. Special Report. HAI Prevention and Environmental Hygiene: The Changing Landscape of Healthcare Delivery. Infection Control Today [serial on the internet]. 2013 Feb [cited 2013 Jul 24]; [28 screens]. Available from: <http://www.infectioncontrolday.com>
3. Orenstein R, Aronhall KC, McManus JE Jr, Fedraw LA (2011) A targeted strategy to wipe out Clostridium difficile. Infect Control Hosp Epidemiol 2011 Nov;32(11):1137-9.
4. Hayden MK, Bonten MJ, Blom DW, Lyle EA, van de Vijver DA, Weinstein RA. Reduction in acquisition of vancomycin-resistant enterococcus after enforcement of routine environmental cleaning measures. Clin Infect Dis 2006 Jun 1;42(11):1552-60.

Table 1. GP Surgery ATP swab test results in RLU. Figures in ( ) are percentage reduction.

TEST SITE / LOCATION*	TEST WEEK						
	1	3	4	5	6	8	
1	Internal lift button	3422	3352	3411	2070	2416	2696
2	External lift button	2984	4078	1749	3660	4620	3835
3	Telephone	7524	5969	8743	14207	11607	5972
4	Internal door handle	9453	11895	3990	8493	5215	13911
5	Table	19800	22104	22 (99.9)	15	169	54
6	S/steel instrument table	498	426	44 (89.6)	13	10	15
7	Cupboard handles	2848	2721	73 (97.3)	234	103	383
8	Work surface	1874	1222	13 (98.9)	96	35	31
9	Treatment couch	4919	2836	82 (97.1)	400	205	109
10	Light switch	15321	16995	18 (99.9)	24	161	42
11	Computer keyboard	10028	9587	169 (89.2)	439	267	296
12	Crèche seating	7769	5213	36 (99.3)	96	99	185
13	Reception desk	8712	7163	147 (97.9)	111	70	182
14	Wall adjacent to crèche	15997	16180	7 (99.9)	17	16	8
15	Desk	3562	3411	38 (98.9)	207	240	46
16	Sphygmomanometer	1845	1749	26 (98.5)	366	486	716

Aqueous Guard® ABV Cleaner applied at beginning of week 4 only

\* Test locations 1 – 4 were 'control' sites and did not receive the intervention (ABV Cleaner). Locations 5 – 16 were 'evaluation' sites and received Aqueous Guard® ABV Cleaner at the beginning of week 4.

Table 2. GP Surgery TVC dip-slide test results in colony forming units (CFU).

TEST SITE / LOCATION*	TVC LEVEL PRE-ABV CLEANER	TVC LEVEL POST-ABV CLEANER APPLICATION*
Fridge base	10 <sup>5</sup>	0
Trolley	10 <sup>4</sup>	0
Room surface	10 <sup>3</sup>	0
Peak flow meter	10 <sup>2</sup>	0
Floor	10 <sup>3</sup>	0
Kitchen table	10 <sup>6</sup>	0

\* Locations were tested within 1 hour of application of Aqueous Guard® ABV Cleaner

Table 3. Residential Care Home ATP swab test results in RLU. Figures in ( ) are percentage reduction

TEST SITE / LOCATION*	TEST WEEK													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Dining room control	2529	2163	758	2388	2150	1646	1373	1382	1503	1559	1609	1621	1590	1624
Dining room evaluation	33972	17121	21259	5603	441 (92.1)	7383	3612	2055	307 (85.1)	404	791	1260	1440	1707
Lounge control	18925	7382	3215	3627	5071	15153	8888	9349	5299	5936	10163	12305	20608	8209
Lounge evaluation	5264	4978	2666	2950	513 (82.6)	2332	2582	2452	375 (84.7)	463	395	719	1340	619

Aqueous Guard® ABV Cleaner applied at the end of week 4 and end of week 8 only

### Discussion

The results reported in Tables 1 and 3 demonstrate, without exception, that all locations cleaned and disinfected with Aqueous Guard® ABV Cleaner reported significant reductions in RLU scores compared to previous ATP swab test results where Aqueous Guard® ABV Cleaner had not been used.

In the GP surgery all swab test locations reported a minimum 89% improvement in RLU levels with ten of the twelve surfaces being swabbed reporting a >97% reduction in ATP levels. In the residential care home each time Aqueous Guard® ABV Cleaner was used the ATP levels reported at these test locations dropped by over 80%. (see Tables 1 and 3).

Lower ATP levels (denoted by the reduction in RLU being reported) equate to cleaner clinical environments. This is supported by the data in Table 2 which used dip slides to quantify bioburden at multiple locations before and after cleaning with Aqueous Guard® ABV Cleaner. It is evident from the data presented in Table 2 that the bioburden was reduced to zero after cleaning with Aqueous Guard® ABV Cleaner. Since it is accepted that the cleaner clinical environments reduce the risk of infection<sup>3,4</sup> it is logical to propose that in this evaluation the application and use of Aqueous Guard® ABV Cleaner has reduced the risk of infection and / or transmission associated with the GP and care home by creating and maintaining cleaner environments within these settings.

In both the GP surgery and the residential care home the surfaces cleaned with Aqueous Guard® ABV Cleaner remained cleaner for longer, i.e. post ABV Cleaner ATP levels remained below pre-treatment levels several weeks after the initial application of Aqueous Guard® ABV Cleaner. The reason for this ongoing reduction in ATP levels several weeks after application is a combination of the surface conditioning offered by Aqueous Guard® ABV Cleaner and the persistent nature of its antimicrobial properties.

### Conclusion

Based on the data presented in this evaluation the single step cleaning process using Aqueous Guard® ABV Cleaner in two primary care settings can create and maintain cleaner clinical environments when compared to a standard two-step cleaning regime using neutral detergent followed by sodium hypochlorite.

With environmental surfaces playing an important role in microbial transmission across a range of clinical settings<sup>1,2</sup> the cleaner the surface the lower the risk of infection / cross infection to healthcare providers or users.