

## Rapid Cleaning Control in Hospitals Using ATP Bioluminescence

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### **Introduction**

Hospitals are public institutions where patients, employees and visitors are in contact with each other and there is a relatively high risk of contaminants being transferred from individual to individual. This can be either direct (e.g. handshake, coughing, sneezing), or indirect (e.g. via door handles, taps). It means that cleaning and disinfection is extremely important and needs to be carried out in a professional and structured manner. Rapid cleaning control will give immediate feedback on cleaning procedures and is a valuable tool to monitor and further improve cleaning procedures in many areas within hospitals.

### **Public areas**

Most areas in a hospital are free accessible to patients and visitors. These include entrance hall, hallways, elevators, patient wards, toilets and restaurants. Cleaning of these areas is important to prevent transfer of infections from patients to patients, patients to visitors and visitors to patients. Simple measures like a leaflet informing patients and visitors about basic hygiene behaviour during their stay in the hospital will have a positive effect on the prevention of infection transfer.

Cleaning of public areas needs to be done several times a day, preferably immediately after visiting hours. The cleaning performance needs to be monitored routinely to ensure it is carried out properly.

### **Sterile services**

Effective cleaning and sterilisation of surgical equipment is essential to maintain patient health and safety. The performance of Washer Disinfectors needs to be monitored under the requirements of HTM 2030, and a simple rapid test capable of detecting 2mg protein / m<sup>2</sup> is required.

### **Food preparations**

Hospital kitchens need to be effectively cleaned in order to minimise the risk of contamination in food products. For preparation areas to be clean, all product residues need to be removed and surfaces need to be disinfected. Remaining food residues will inhibit the efficacy of disinfectants and provide a harbour for growth of microorganisms, which will affect food quality and safety. Like in industrial food manufacturing, Hazard Analysis of Critical Control Points (HACCP) guidelines need to be introduced. Benefits to the food preparation are:

- Clean food contact surfaces are the best guarantee for high quality, safe food products.
- Quantitative, objective cleaning control provides due diligence and improves hygiene standards.
- Rapid hygiene monitoring quickly identifies potential problem areas before they can become a serious hazard.

### **Rapid cleaning control**

The rapid monitoring of cleaning performance is done by detection of ATP (Adenosine Triphosphate) on critical surfaces. ATP is a biochemical present in all living organisms and biological residues. If ATP is detected on a cleaned surface, it means the cleaning was not effective and the surface is a hazard for spread of microorganisms. The ATP method is quick, simple and easy to do and objective. The result is given in RLU (relative light units) and interpreted automatically by the instrument (Pass/Caution/Fail), so the operator can take appropriate action based on the result. Results are stored in the instrument memory and can be uploaded to a computer for further analysis and data management.

When applied immediately after cleaning, the ATP method will provide important feedback on the efficiency of the cleaning. Hospital hygienists can use this information for further improvement of hospital hygiene.

### **Implementation of the ATP method**

It is important to have a systematic approach to hygiene monitoring. A list of control points needs to be identified and corresponding pass/fail limits need to be determined. Hygiene recommends using the pass/fail limits in the table below for hygiene monitoring in hospitals (guideline only!). These limits are valid after cleaning and need to be verified on a regular basis (e.g. every 3 months). Sampling needs to be done by trained staff. The frequency of testing depends on the risk associated with the control point.

If the result is in between the pass and fail limits, it means that the control point is not clean and a contamination risk may be developing. A re-test is needed and if the result is again in between both limits, a re-clean is recommended.

The following recommended standards for clinical application of the ATP test method have been determined by extensive testing.

For example >300 samples from 13 different sample locations and 13 different hospital wards were collected and analysed.

<b>Application</b>	<b>General Recommended limits</b>	
	<b>Pass (RLU)</b>	<b>Fail (RLU)</b>
Hospital public areas	<150	>300
Sterile services – general	<10	>20
Washer disinfectors	<5	>10
Food preparation and Catering	<10	>30

Examples of control points and typical ATP range for clean and dirty surfaces are shown below.

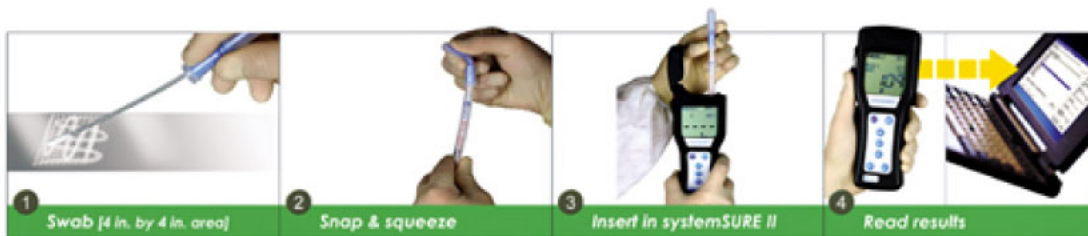
<b>Hospital</b>	<b>Pre-clean Average RLU (range)</b>	<b>Post-clean Average RLU (range)</b>
<b>- Public areas</b>		
Toilet under seat	179 (44 - 438)	18 (6 - 49)
Toilet door plate	76 (48 - 173)	21 (10 - 35)
Toilet soap handle	42 (22 - 78)	8 (2 - 13)
Toilet bin lid	223 (38 - 916)	82 (15 - 351)
Patient seating area	152 (21 - 594)	68 (11 - 195)
Toilet flush handle	79 (40 - 176)	10 (6 - 24)
Staircase - Handrail	485 (48 - 2050)	61 (17 - 189)
Staircase - Doorplate	64 (38 - 111)	28 (2 - 50)
Lift - Hand call button	123 (41 - 410)	20 (3 - 37)
<b>Clinical areas;</b>		
Bed locker top A	314 (37 - 767)	26 (7 - 40)
Bed locker top B	172 (26 - 882)	NT
Bed	340 (4 - 1389)	NT
Bedside table	13 (1320)	NT

### **Food Preparation area**

<b>Control Point</b>	<b>Pass (RLU)</b>	<b>Fail (RLU)</b>
Stainless steel food contact surfaces	<10	>20
Knives	<10	>20
Chopping board	<20	>40
Food containers	<10	>20
Trays	<10	>30
Sink	<10	>30



## ATP test procedure



The ATP samples are taken after cleaning. To be able to compare results from different cleaning cycles, samples should preferably be taken from the same location every time. The Ultrasnap ATP swab is pre-wetted with an extractant to extract ATP from cellular material on the swab.

- To take a sample, take the Ultrasnap out of the shaft and swab the area of interest. Make sure not to touch anything else but the area of interest and apply sufficient pressure to remove possible residues on the surface.
- Place the swab back into the shaft and note the swabbing location on the swab label. The swab can be kept up to 4 hours at ambient temperature before activating.
- Switch the SystemSURE instrument on to start the 60-second calibration control cycle.

- When the instrument is ready for use, activate the Ultrasnap swab by snapping the valve in the bulb of the device (see kit insert for detailed instructions).
- Squeeze the bulb twice to release all liquid stable enzymes to the bottom of the device.
- Shake gently for 5 seconds to mix the enzyme and the sample.
- Place the device into the systemSURE II instrument and press 'OK' to start the reading.
- Note the result after 15 seconds.



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