STERISAFE™ - Pro Healthcare Environmental case study in a hospital.

Full-Depth Disinfection Cycle (FDDC)
Biocidal effect in terminal disinfection

Hospital in the state of Rhineland-Palatinate, Germany
The hospital received a STERISAFE™-Pro unit for demonstration tests in June 2017. A certified STERISAFE™-Pro operator carried out terminal disinfection in patient rooms for three weeks. The terminal disinfection effectiveness was measured both with visual microbiological contact slides and with microbiological analysis from a third-party microbiology laboratory. The results show that STERISAFE™-Pro elevated the level of hygiene in the treated rooms by a factor of 3.3 compared to the current manual disinfection method.
Customer

The hospital is a tertiary care institution comprising 15 clinics, 5 medical institutes and 12 centers of excellence. It is the teaching hospital of a local university. It has 900+ beds and is the second largest hospital in the region. The hospital is a certified KTQ®, regional and national healthcare provider. The local municipality owns the hospital.

Current cleaning and disinfection practices
The clinic delegates the cleaning and disinfection services to a sister company, which has 130 employees. The clinic performs manual cleaning with water and detergent for terminal disinfection. It does not employ an advanced method for room disinfection.
Preparation of the room and sealing of the ventilation.

Full-Depth Disinfection Cycles (FDDC), with a couple of exceptions, were carried out provided that the patient room was already manually cleaned. Manual cleaning is a prerequisite for effective FDDC. Sealing a patient room took on average 15 minutes. The volume of the patient rooms disinfect was in the range of 60 m³ to 150m³.
Microbiological Results

STERISAFE™ and the hospital relied on two means for assessing the terminal disinfection efficacy of FDDC: Visual Hygicult TPC on site tests (Table 1) and third party microbiology laboratory (Chart 1 to 3).

Visual Hygicult TPC on site tests

The quality assurance personnel decided on taking 180 minutes FDDC cycle and 60 minutes FDDC cycle. The STERISAFE team refers to the former as the standard FDDC, the latter is extremely short FDDC.

<table>
<thead>
<tr>
<th>Table 1. Visual Hygicult TPC on site tests</th>
<th>After manual disinfection and before STERISAFE™ - Pro terminal disinfection</th>
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</thead>
<tbody>
<tr>
<td>Door handle entrance door inside</td>
<td>Door handle balcony door inside</td>
</tr>
<tr>
<td>Bathroom under the mirror</td>
<td>Wardrobe door inside</td>
</tr>
<tr>
<td>Visitors table</td>
<td></td>
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</tbody>
</table>

Source: INFUSER ApS

The first series of pictures demonstrate that even after the standard protocol for manual disinfection, all tested spots are still contaminated. Spots might easily be forgotten and not disinfected at all by the staff. The second series show the effect of the FDDC and STERISAFE™-Pro. The contamination of the surface decreased on all spots and 4 out of 5 spots have a complete disinfection. The last one still has contamination, probably due to the very heavy load of initial contamination, as seen on the first picture.

High-touch surfaces were selected for taking the samples such as door handles, table (see table 2).
Microbiological Results

Table 2. Location samples of the Hygicult TPC

The first series of pictures demonstrate that even after the standard protocol for manual disinfection, all tested spots are still contaminated. It might well be either to the low efficacy of the disinfectant used, or to spread coverage, and required contact time linked to manual work. Spots might easily be forgotten and not disinfected at all by the staff. The second series show the effect of the FDDC and STERISAFE™-Pro.

The contamination of the surface decreased on all spots and 4 out of 5 spots have a complete disinfection. The last one still has contamination, probably due to the very heavy load of initial contamination, as seen on the first picture. High-touch surfaces were selected for taking the samples such as door handles, table (see table 2).

Source: INFUSER Ap5
Third party microbiology laboratory:

LADR GmbH Medizinisches Versorgungszentrum Baden-Baden

Chart 1. Room occupied by patient infected by MRSA.

The data from chart 1 shows that the manual removes only partially the contaminations. The manual disinfection on the patient table only achieved a 75% reduction.

Source: LADR Lab results
Chart 2. FDDC effect in a room occupied by patient infected by Clostridium

Please note that both charts 2 and 3 exclude the before manual cleaning column.

Source: LADR Lab results
Chart 2. FDDC effect in a room occupied by patient infected by Clostridium

These two tests demonstrate the efficacy of the STERISAFe™-Pro in real environment and even with very high load of contamination (>30 CFU).

Source: LADR Lab results
Conclusion

The tests in this German hospital demonstrated three major points.

a) The STERISAFE™-Pro unit has been used daily during a 3-week period in the hospital effortlessly and without major interference with the workflow. The sealing process has been well implemented and was not perceived as a barrier.

b) The standard manual method for disinfection used today in the hospital is not effective enough to achieve total level of disinfection on surface. Only 30% of the tested spots after manual disinfection fell under the threshold value for surface hygiene in hospital (<5 CFU/cm²). And only 20% reached a full disinfection (<2.5 CFU/cm²).

Because of the manual nature of this procedure, many errors and misses are likely to occur. This also has been demonstrated in several other studies. This argues for the need of implementation of new disinfection technologies which are both automated and reliable.

c) STERISAFE™-Pro and the Full-Depth Disinfection Cycle (FDDC) technology attained a high level of disinfection with total CFU reduction with a better reach than the manual disinfection. After FDDC 80% of the spots reached the sufficient level for surface hygiene in hospital (<5 CFU/cm²) and 65% even reached a total kill (<2.5 CFU/cm²). In other words, STERISAFE™-Pro elevated the level of hygiene in the treated rooms by a factor of 2.6 for <5 CFU/cm² and by a factor of 3.3 for <2.5 CFU/cm².

The elevated hygiene levels contribute in breaking the chain of infection, thus decreasing the number of hospital acquired infection (HAIs).