

Case Study: Bio-decontamination of an intensive care unit using hydrogen peroxide vapour

Site:	<i>Henri Mondor C.H.U.</i>
Location:	<i>Paris</i>

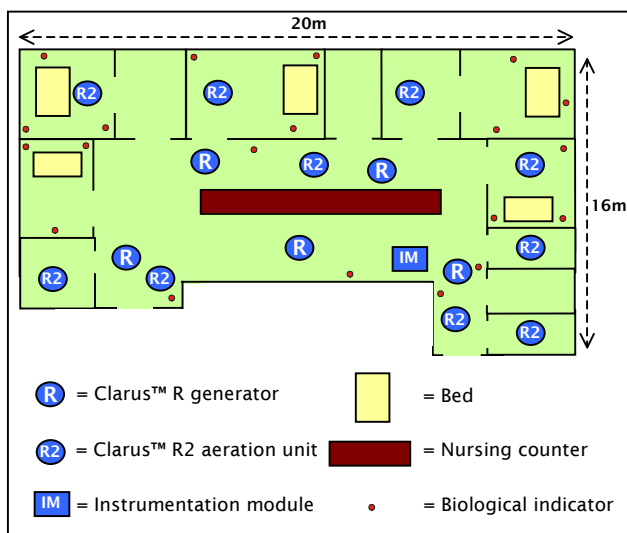
The Challenge

Henri Mondor hospital (Paris) discovered environmental contamination with *Acinetobacter baumannii* during an outbreak in its intensive care unit. There were a number of fatalities linked to the *A. baumannii*. The Unité Maurion Rapin is a 12 room, 800m³ suite located in a University hospital in Paris, and as such contains a large quantity of sensitive electrical equipment and consumables which must not be affected by any bio-decontamination process, and must be left residue-free and ready for use. In addition to this, due to the constant pressure on intensive care suites the bio-decontamination had to be completed within a 24-hour period.

Solution

Notwithstanding a week-long intensive deep clean there was still concern about microbial contamination. Due to the vulnerability of the patients returning to this area a further treatment was required to bio-deactivate all remaining micro-organisms.

BIOQUELL’s Room Bio-decontamination Service



(“RBDS”) was selected to treat the area. Five Clarus™ ‘R’ hydrogen peroxide gas generators were strategically placed in the suite along with 6 stirring fans to ensure even gas distribution; ten R2 aeration units were also included to remove the H₂O₂ vapour at the end of the cycle. An instrumentation module was located in the room to monitor the key parameters and link the equipment to the external control computer. The unit was then sealed before bio-decontamination commenced and remained sealed until the H₂O₂ vapour had been removed via catalytic conversion to water vapour and oxygen. The entire process was monitored and controlled from outside the room via the control computer.



Gassing Cycle Verification

Geobacillus stearothermophilus spores dried onto metal discs at an inoculum of 10⁶ and sealed in Tyvek pouches were used as biological indicators (BIs) to verify the gassing cycle. A total of 20 BIs were set up in challenging locations throughout the suite. A BI map was generated for the area to trace BI locations (see diagram below, left). In addition to this, specific target areas were independently swabbed before and after the RBDS to give a clear picture of the bio-burden and its subsequent reduction.

Results

The BIs were retrieved after aeration and incubated for seven days at 60°C. Control BIs that were not exposed to the bio-decontamination process were positive. **All BIs from the ICU suite were negative.**

The swabbing indicated a substantial level of microbial contamination before the RBDS, and effectively complete bio-deactivation in all areas of the suite (97% of surfaces contaminated with >1 colony forming unit (cfu) per 24cm² before RBDS compared to <1% after RBDS).

All of the sensitive electronic equipment which was exposed to the bio-decontamination process was unaffected, demonstrating hydrogen peroxide's excellent materials compatibility.

Conclusion

The bio-deactivation target of a 6-log reduction in Tyvek pouched *G. stearothermophilus* spores was demonstrated in the unit. The Clarus™ R provides a very rapid and effective bio-decontamination system, which combined with the rapid aeration method produces a minimal cycle time. After the request was made from the Henri Mondor hospital in Paris the RBDS service was completed within



36 hours including dispatching a team from BIOQUELL's UK headquarters to perform the bio-decontamination.

Background: Bio-decontamination within a room or chamber is achieved by depositing an even layer of approximately 1 micron 'micro-condensation' of H₂O₂ over all surfaces. The term 'micro-condensation' may be defined as a microscopic film of H₂O₂, which being at a sub-micron level is invisible to the naked eye. Scientific research has proven that it is this low temperature, residue-free deposit that actually deactivates micro-organisms during the gassing process.



This system can be used in many other applications such as bio-decontamination of specific problem-causing micro-organisms or for general bio-decontamination of laboratories, including CL3 facilities, cleanrooms, pharmaceutical manufacturing plant, etc. The Clarus™ R system is infinitely scalable so that very large areas and entire suites can be rapidly and effectively bio-decontaminated.

For further details of H₂O₂ bio-decontamination solutions including equipment and room services, please contact BIOQUELL.

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