

Case Study: Bio-decontamination of an Ambulance using hydrogen peroxide vapour

Site:	<i>Matera Hospital</i>	<i>Maternity</i>
Location:	<i>Athens, Greece</i>	

The Challenge

Ambulances were suspected of posing a credible infection risk to patients being transported from their homes into hospital due to environmental nosocomial pathogens. Matera Hospital required a rapid, viable solution to bio-decontaminate ambulances that had previously carried infectious patients.

Solution

Matera Hospital selected BIOQUELL's Room Bio-decontamination Service (RBDS) to bio-decontaminate their ambulance fleet. A Clarus™ 'R' hydrogen peroxide gas generator was strategically placed in the treatment area of the ambulance along with two Clarus™ R2 aeration units to remove the H₂O₂ gas upon completion of the injection phase of the cycle.



An instrumentation module was also placed in the room in order to carefully monitor the key cycle parameters and link the equipment to the external control computer.

One of the primary advantages of the RBDS system is that all of the paramedic equipment contained within the ambulance was able to remain 'in-situ' during the cycle enabling complete bio-decontamination of both the vehicle and medical equipment.

The entire bio-decontamination cycle lasted approximately 4 hrs per ambulance, after which the vehicle was totally free of hydrogen peroxide and able to be returned to ambulance crews.

Background: Bio-decontamination within a room or chamber is achieved by depositing an even layer of '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 rapidly deactivates micro-organisms during the gassing process.



Gassing Cycle Verification

The efficacy of the bio-decontamination cycle was validated using biological indicators. 6-log inoculums of Geobacillus stearothermophilus spores dried onto metal discs and placed in tyvek pouches were used as biological indicators (BIs) to validate the gassing cycle. Three BIs were

placed in challenging locations around the ambulance, below the stretcher trolley, inside a medicine rack and behind items in a storage void.

The BIs were retrieved after the aeration phase of the bio-decontamination cycle and incubated in tryptone soya broth for 7 days at $60 \pm 2^\circ\text{C}$. Two positive controls and one negative control were also incubated with the BIs. After incubation only the positive controls showed signs of growth, thus confirming a full 6-log reduction of *G. stearothermophilus* spores throughout the treatment area of the ambulance.

Upon completion of the bio-decontamination the client also placed 'contact plates' at 10 locations around the vehicle and after suitable incubation no bio-burden was detected any where in the vehicle.



Conclusion

The bio-deactivation target of a 6-log reduction in *G. stearothermophilus* spores was demonstrated in the treatment area of the ambulance and of all the equipment stored within. RBDS provides an effective, low temperature and residue free bio-decontamination system, which combined with the rapid aeration method, produces a minimal complete cycle time.

The total cycle time was less than 4 hours, after which the vehicle was safely returned to ambulance crews ready for immediate re-deployment.

The RBDS system has proven efficacy against environmentally associated nosocomial pathogens including MRSA, Acinetobacter, C.difficile, and VRE giving the RBDS service many applications within the healthcare sectors.

Healthcare applications can include both 'outbreak' and scheduled deployment options. 'Outbreak' deployments involve undertaking a 'one-off' bio-decontamination of any areas affected by an outbreak of a specific organism. A favourable alternative involves establishing a bio-decontamination schedule for an on-site 'implant' team of BIOQUELL engineers regularly bio-decontaminating occupied areas (wards, siderooms, theatres etc) in order to reduce nosocomial infection rates also the associated monetary costs and bed-occupancy issues.

For further details of H_2O_2 bio-decontamination solutions including equipment and room services, please contact BIOQUELL.

For further information contact:

BIOQUELL (UK) Ltd, Walworth Road, Andover,
Hampshire, SP10 5AA. United Kingdom
Tel: (44) 01264 835853
Fax: (44) 01264 835854
Email: RBDS@bioquell.com
<http://www.bioquell.com>