UV222™ Report: Installation in Ambulance

PROJECT
Falk ambulances
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Report

Disinfection of patient cabin with UV222™ lamps from UV Medico

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Background

With this study, we wanted to determine and verify the anti-microbial effect of a UV222TM lamp from UV Medico mounted in the patient cabin of an ambulance from Falck Group. Previous scientific reports from international universities have documented that UV222 lamps inactivates various pathogenic microorganisms including several bacteria, bacterial spores, viruses, and fungi due to the emission of Far-UVC light at 222 nm[1][2][3][4]. In addition, UV222 lamps have recently been shown to be effective in inactivating SARS-CoV2, the etiological background for the COVID-19 pandemic [5].

[1] Hessling et al., 2021, The impact of far-UVC radiation (200–230 nm) on pathogens, cells, skin, and eyes – a collection and analysis of a hundred years of data.
[2] Eadie et al., 2021, Far-UVC efficiently inactivates an airborne pathogen in a room-sized chamber.
[3] Welch et al., Far-UVC light: a new tool to control spread airborne-mediated microbial diseases.
[4] Narita et al., 2020, Ultraviolet C light with wavelength of 222 nm inactivates a wide spectrum of microbial pathogens.
[5] Buonanno et al., 2020, Far-UVC light (222 nm) efficiently and safely inactivates airborne human coronaviruses.

Experimental setup

Testing the anti-microbial effect of ceiling mounted UV222 lamp in an ambulance.

The UV222 lamp was mounted in the upper right corner of the ambulance cab (figure 1). Tests were performed using HygiCult TPC (Aidian) to determine the number of live bacteria (colony forming units, CFU) on different surfaces in the cabin. After sampling, HygiCult TPC test samples were stored in a heating cabinet (37 degrees Celsius) before the bacterial count was performed. Colonies were counted and presented as Colony Forming Units (CFU) per cm^2.

The various surfaces were spiked with live bacteria of the species Staphylococcus epidermidis. This approach was chosen to simulate a significant contamination of the cabin with bacteria. These bacteria are part of the normal human flora and are often found naturally on surfaces in office environments. The bacteria are also known to cause opportunistic infections in hospitals. Samples were taken to determine bacteria counts before and after 222 nm exposure. The UV222 lamps were left on for 2 hours before sampling. In addition, the natural reduction in bacteria counts without UV222 light over 2 hours was measured.

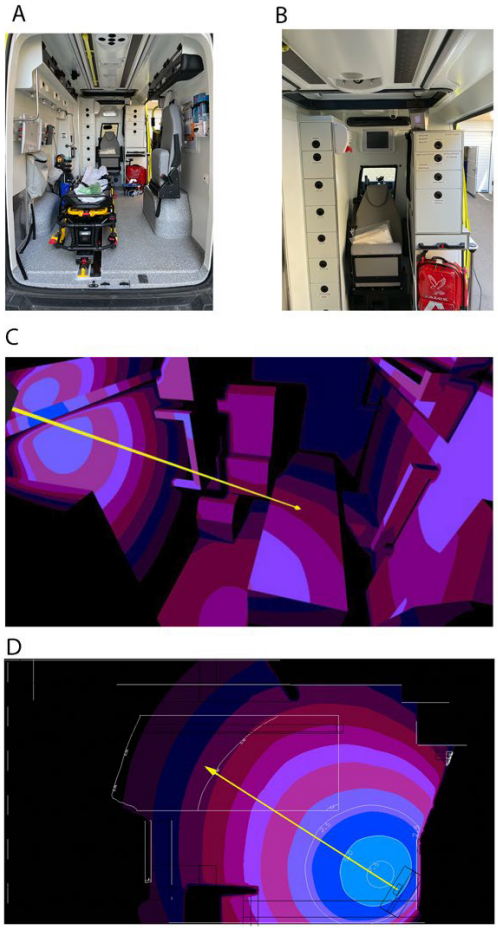

Figure 1:
A) and B) photos demonstrating where the UV222 lamp is installed in the cabin.
C and D) Simulation of light intensity in the cabin with the placement indicated in A and B (units in µW).

Results

As indicated in Figure 2A, exposure to 222 nm UVC from the mounted UV222 lamp resulted in a significant reduction in the number of bacteria as measured by germ count. It can be assumed with a high degree of certainty that the reduction in bacteria was caused by illumination from the UV222 lamp as the reduction in bacteria over the same time interval without exposure to 222 nm UVC from the UV222 lamp was negligible (Figure 2B).

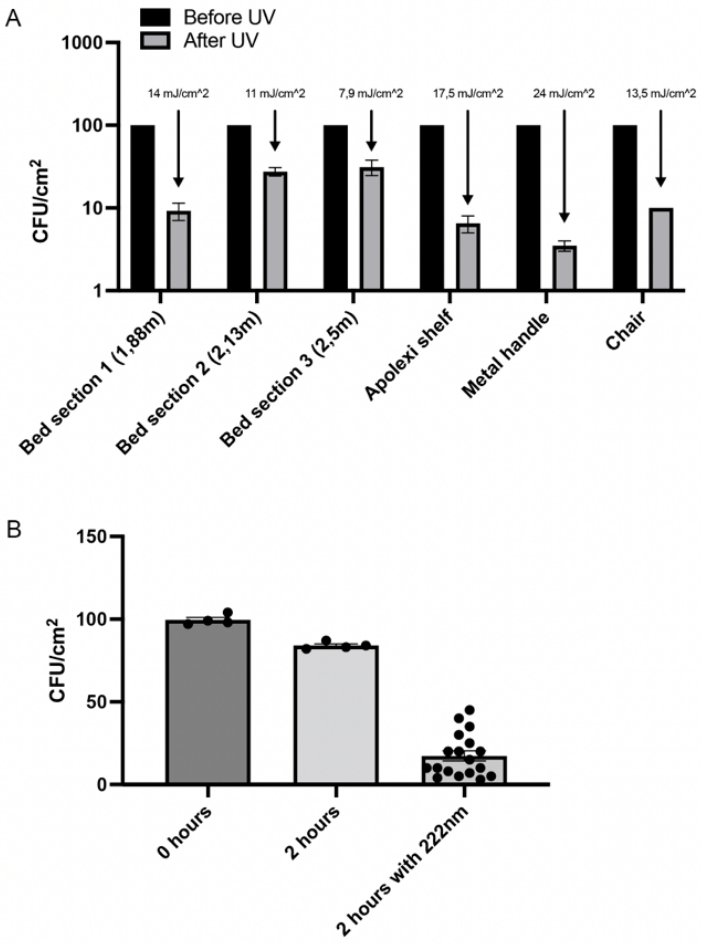

Figure 2: A) The graph displays counted CFUs for indicated locations in the ambulance before UV222 exposure (black) and after UV222 exposure (grey). The figure also indicates distance to lamp for each location and the corresponding dose this area received based on simulation in figure 1. B) The graph indicates the natural reduction of CFU over the 2 hours test period compared with initial CFU count and after 2 hours with 222nm exposure.
unpublish data

Conclusion

Installation of a UV222 lamp in the patient cabin of an ambulance will significantly reduce bacterial load in the cabin. This includes bacteria on surfaces such as patient bed, handles chairs, and panels. Further, viruses and bacteria suspended in the air will be closer to the lamps and thus receive higher doses than those on the tested surfaces. Further, viruses need approximately 10x less of the 222 nm for inactivation. It is therefore safe to assume that this setup will have a strong anti-viral effect as well.

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